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Some two years have elapsed since the synthesis of any new sulphonamides with striking therapeutic activity, and it is now possible to say with some certainty what particular compounds will do in actual practice and what is the best procedure for tackling infections by organisms within their range of activity.

HISTORICAL

The beginning of chemotherapy in its present form was the synthesis by Jacobs and Heidelberger (1917) in New York of a number of azocuprein sulphonamides which were highly bactericidal in vitro, and it is something of a medical tragedy that no further study of these and allied compounds was undertaken until 1933. In this year, after experimental work had demonstrated that sulphonamido-chrysoidin was likely to be of value, this compound was used in clinical medicine and proved to be effective against streptococci of the β-hæmolytic type, meningococci and gonococci. In some respects the ease with which different agents may be tested against β-hæmolytic streptococci in mice has been unfortunate, inasmuch that attention has continually been focused on infections with this organism to the exclusion of the staphylococcus, a much commoner and at present a more lethal organism when it invades the blood-stream (Butler 1940). Danger lies in arguing that the same compounds administered in the same way will be required in the treatment of both streptococcal and staphylococcal infections simply because both organisms happen to be cocci. The different course of infections by the two organisms in the human subject shows how distinct they are.

While interest was centred on the action of sulphonamido-chrysoidin on certain streptococci came the fundamental discovery by Tréfouël and others (1935) that the activity of this compound lies in its sulphanilamide nucleus, this type of compound being long known to chemists working in the dye industry for its mordant properties. The observation that sulphanilamide was a therapeutically active drug made possible most of the chemotherapeutic research of recent times. Sulphanilamide, while less toxic than sulphonamido-chrysoidin, is a powerful drug, and its indiscriminate use may be fraught with the well-known unpleasant side effects common to all sulphonamides. The benzyl derivative of sulphanilamide (Proseptasine) is active against streptococcal infections, and seems to be less toxic than sulphanilamide. Sulphonamido-chrysoidin, the red compound presented in tablet form as Prontosil Rubrum, is held by some to be a more active streptococcicidal agent than sulphanilamide. Possibly because the dye compound is less readily soluble and therefore more slowly absorbed than sulphanilamide its action is more constant, but for this reason in fulminant disease sulphanilamide is the better compound to use. A soluble dye (disodium 4′-sulphaminophenylazo-1-hydroxy-7-acetylaminonaphthalene-3:6-disulphonate), marketed as Prontosil Soluble, is also available for therapeutic use. The risk of toxic reactions with these red compounds, apart from the inconvenience of dyes, limits their sphere of usefulness, and new and better drugs have largely superseded them. It has moreover been found possible to prepare a compound of sulphanilamide with a solubilising group which is suitable for parenteral administration. This drug, whose formula is disodium-para-(γ-phenyl-propyl-amino)-benzenesulphonamido-α-γ-disulphonate, and which is marketed under the name Soluseptasine, has high antistreptococcal and antimeningococcal potency.

The therapeutic range of the earlier compounds examined is thus limited, and continued search has been made for derivatives of sulphanilamide with wider activity. In 1937 and 1938 there was synthesised a new class of compounds in which one hydrogen atom of the sulphonamide group (SO_2NH_2) was replaced by various substituents. Four compounds produced in this way deserve detailed attention: Uleron, which is para-aminobenzene sulphonamidobenzenesulphon-dimethylamide; Albucid, which is para-aminobenzene-sulphonacetamide; M. & B. 693 or sulphapyridine, which is 2-(para-aminobenzenesulphonamido) pyridine; and Thiazamide or sulphathiazole, which is 2-(para-aminobenzenesulphonamido) thiazole.

Uleron, originally introduced as an antistaphylococcal agent, has also been used in the treatment of gonorrhœa, but this drug has proved disappointing in the treatment of early infections. A considerable number of cases of severe peripheral neuritis have followed its exhibition, and outside Germany its use in gonorrhœa has largely been abandoned. Albucid has the advantage of seldom causing unpleasant side effects, but it is generally regarded as a less powerful gonococcicide than the other and more popular sulphonamides. The synthesis of sulphapyridine by Ewins and his co-workers was the first outstanding advance after the demonstration by Tréfouël and his colleagues of the properties of sulphanilamide. The outstanding merit of sulphapyridine is its activity against pneumococcal infections of all types, but it also appears to be the most potent remedy yet available for gonorrhœa and meningococcal meningitis. The fact that it is active against certain streptococcal infections is not surprising, but its routine use for these infections does not seem to be justified when other equally potent and better tolerated drugs are available. Certain cases of staphylococcal infection have responded to the use of sulphapyridine when high concentrations in the blood have been obtained.

The thiazoles are capable of further substitutions in the thiazole ring, to produce methyl and phenyl derivatives. The thiazoles as a class are moderately active against the common pathogens and detailed study of them in the clinical field was deferred until recently when reports from the United States suggested that they were of value in the treatment of staphylococcal infections. These somewhat optimistic reports have not been wholly confirmed in England, but the clinical trials have focused attention on staphylococcal infections as a whole, and on the possibility of using existing sulphonamide compounds in their treatment.

NEW APPROACH TO ACUTE INFECTIONS

To obtain the best results from these new remedies it is important to pay less attention to the conventional names of particular conditions than to the underlying organisms. For example, in the past the terms lobar pneumonia and bronchopneumonia have been arbitrarily used, and little importance has been attached to their bacteriology; nowadays, however, the treatment as well as the prognosis is seen to turn on the nature and type of the organisms, and not on whether the lesion is alveolar or peribronchial in distribution. Fortunately many acute respiratory infections respond to treatment with one or other of the sulphonamides, but when a case is encountered which appears refractory to treatment it is good practice, if this had not already been done, to examine the flora of the sputum and see whether the predominant organism is one likely to respond to chemotherapy at all and, if so, which of the various compounds available is most suitable. In the same way the infecting organism should be determined whenever possible when treating acute infections of the skin or subjacent tissues by chemotherapy with or without the help of surgery. The kind of treatment successful in, say, a streptococcal infection is very different from that necessary in one due to staphylococci, for the latter organism is only acted on to any extent by two compounds—sulphapyridine and sulphathiazole—and then only when they are present in high-concentrations in the blood conveyed to the affected part.

The haphazard exhibition of these new drugs to all and sundry infections is most undesirable, for there are still a number of infective processes which prove irresponsive to chemotherapy and in these prolonged administration may be not only useless but actually harmful.

* Based on an address given to the Cork Clinical Society, University College, Cork, Nov. 15, 1940.

BACTERIA INFLUENCED BY SULPHONAMIDES

The organisms affected by chemotherapy can be divided into two groups—those which are highly susceptible, and those on which the drugs exert only a moderate activity. In the first group are β-hæmolytic streptococci, all types of pneumococci, meningococci, gonococci and certain strains of *Escherichiacoli* and *Bacillus pestis*. These organisms are the principal causes of illness commonly attended by a high case-fatality rate. In the second group are a large number of micro-organisms which show a greater or less response to the sulphonamides depending partly on the location of the infection in the body and partly on the manner in which treatment is carried out. An instance of the effect of location is the typhoid bacillus; the typical general disease due to this organism is uninfluenced by any drug, but in the "carrier state" with persistent infection of the urinary tract sulphapyridine acts almost as a specific. Experimental work provides an explanation of this difference. The typhoid bacillus is only slightly affected by sulphonamides in therapeutic concentrations both in vitro and in vivo, but is killed by the concentrations attained in the urine, often amounting to 10 or 20 times those in the blood. With infections due to low-grade streptococci a different process operates, for many strains are fairly responsive to treatment but the lesion they cause has the peculiarity of shielding the organism from effective concentrations of the drug, as in subacute bacterial endocarditis, and a somewhat similar mechanism may operate in pneumonia caused by the same organisms.

The common organisms of respiratory catarrhs, with the exception of *Hæmophilus influenzæ* and the Friedländer bacillus, exhibit only a sluggish response to chemotherapeutic agents and the diphtheria bacillus none at all. Scarlet fever is not influenced materially by sulphonamides, but they may be strikingly effective when complications arise. Gas gangrene, tetanus and anthrax are often successfully treated with sulphapyridine, but particularly in gas gangrene variations in strains of the organisms make results inconsistent; steps must also be taken to combat the exotoxins circulating. In staphylococcal infections treatment is influenced by the nature of the lesions commonly present and also by the fact that the organism is only influenced by certain sulphonamides in high concentrations. Local lesions in the acute febrile stage respond sporadically to sulphathiazole but there is still doubt about the best way of maintaining an effective level in the blood. For bacteræmic cases both sulphathiazole and sulphapyridine are valuable when given by intravenous drip of the sodium salt in normal saline, the dosage being controlled by periodic estimation of the blood concentration.

Virus infections, except that causing lymphogranuloma inguinale, are unaffected by existing sulphonamides, although of course they may control concurrent microbic infections.

USE OF SERA

The advances of chemotherapy have been entirely in the antibacterial direction, and none of the new compounds affect toxins except in so far as they eradicate their source. On theoretical grounds it is desirable to employ antitoxic sera as adjuvants to chemotherapy, but practical considerations with regard to their administration, apart from the factor of availability in the right place at the right time, do not make combined therapy easy. With the exception of some cases of gas gangrene and acute staphylococcal infections the results of chemotherapy alone are so consistently good that little harm results from failure to administer serum. Much of the danger from infections with gas-producing organisms of a severe type is due to the exotoxins present, the effects of which may be mitigated by good antitoxin. In acute staphylococcal infection there is increasing evidence that the early use of antitoxin with chemotherapy is beneficial (Valentine and Butler 1939).

DOSAGE

Chemotherapy has revolutionised the treatment of certain acute infections but the method is still subject to many limitations and it is important that enthusiasms for new things should not exceed knowledge of their application. One patient cured somehow is worth any number of fully investigated dead ones, but patients will always have better prospects of recovery if treated scientifically than by rule of thumb. A methodical approach to the treatment of acute infections is not difficult now that laboratory facilities are readily available for doctors who have neither the time nor the inclination to undertake clinical pathology. If the infecting organism can be identified with precision the appropriate compound can be selected for treating it, but treatment should not be unduly delayed for laboratory reports; the doctor must rely on his clinical acumen to decide the most likely nature of the infection, and make any necessary adjustments later when pathological reports are ready. Close liaison between the clinician and the pathologist is particularly important in the control of obscure or resistant infections, since it is possible to determine by direct test whether a particular organism is influenced by any compound.

Another direction in which clinical pathology can help is by periodical determinations of the sulphonamide content in the blood of patients undergoing chemotherapy. The concentrations of different compounds necessary to attain the optimum effect have been determined, principally by clinical experience, but modifications may be required to meet changing circumstances. When using sulphanilamide a blood level of 10 mg. per 100 c.cm. is required, and with sulphapyridine a level of 5–10 mg. per 100 c.cm., except in acute staphylococcal infections when at least 15 mg. per 100 c.cm. seems desirable. Agreement about the levels needed with sulphathiazole has not yet been reached, but in pneumococcal and meningococcal infections they must, it seems, be rather higher than those required with sulphapyridine, and in staphylococcal septicæmia about 20 mg. per 100 c.cm. should be aimed at.

It is a fundamental rule in deciding on the dosage of any sulphonamide that an effective level should be attained in the blood as rapidly as possible and then maintained by regular four-hourly administration. This may be done by giving two or three initial loading doses, consisting of twice the amount considered necessary for maintenance. If oral therapy is impracticable because the patient is vomiting or too ill some form of parenteral therapy must be given. The choice of soluble compounds is more or less limited to three—soluseptasine and the sodium salts of sulphapyridine and sulphathiazole. There is considerable discussion about the best way of giving these compounds. The difficulties do not arise solely over the question of their pH but also over the best way to get them into the circulation. In severely ill or collapsed patients the peripheral circulation is inactive, so that intramuscular injections may be sluggish in action and be attended by local necrosis, a situation which cannot arise if the intravenous route is adopted (Thrower 1940). Provided that only one or two injections are necessary little harm is likely to be done by giving them intravenously in the ordinary way, but if prolonged parenteral therapy is required a continuous intravenous drip of the compound dissolved in normal saline is the ideal technique, and has in my experience never been attended by untoward results. Intrathecal injections must never be given.

Clinical practice has shown that the giving of somewhat arbitrary quantities of the various drugs by mouth or injection is on the whole attended by good results. A common cause of failure is that, owing to irregularities in absorption or over-rapid excretion, effective blood levels have not been attained, so that the periodic determination of blood concentrations is an important aid to treatment in many infections. No patient is ever the worse for intensive treatment at the beginning of an infection and a few subsequent days of high dosage. Troubles arise through so-called moderate doses being given, which are usually ineffective and have to be continued for longer than would otherwise have been necessary. If the organism is or has become drug-fast a change to another compound known to be active against the particular infection concerned should be made (Whitby 1938). A total dosage of between 20 and 30 g. is sufficient to control most infections.

ADJUVANTS TO TREATMENT

The success of sulphonamide therapy in difficult circumstances must not detract from the importance of

ancillary methods which will help to overcome the general effects of an acute process. One point particularly requires emphasis—the value of recumbency throughout treatment. As a rule the acuteness of the illness decides this automatically but many less ill patients do take these remedies while walking about. There is a higher incidence of side effects among these people, and it is questionable whether the drugs do much good in the doses given to ambulant patients except in gonorrhœa, where the causal organism is highly susceptible to sulphonamides; even here results are much better when the patients are hospitalised.

SIDE EFFECTS

We must distinguish between complications due to the disease and those due to treatment, and must recognise that many patients now live to develop complications who without chemotherapy would have died before they became apparent. Of the true side effects of chemotherapy a particularly troublesome one is nausea with or without vomiting, and considerable attention has been directed to its causes and prevention. Existing evidence suggests that there is a local action probably in the stomach combined with a central action in the medulla. The local action may be prevented to some extent by suspending the drugs in milk or better still in certain mucilages; with sulphapyridine the regular administration of dilute hydrochloric acid seems to be of value, although just what the significance of variations in the acidity of the gastric juice may be is as yet undetermined (Gaisford and Whitelaw 1940). The sulphonamide content of the blood must be a factor in the causation of general reactions, but on present evidence it seems that fluctuations in the blood levels are a more potent cause of trouble than the absolute amount present, since high levels which are constant are better tolerated than irregular lower ones.

WOUND SEPSIS

The principles involved in the treatment of wounds are no different from those of the control of acute infections elsewhere in the body by the same types of organism. Interest at the moment centres on the value of applying sulphonamides locally to wounds, but it must be remembered that they are at the same time being submitted to constantly improving surgical technique, and it is impossible to say whether the good results claimed come from the drugs or the surgery. The feeble activity of sulphonamides on micro-organisms in albuminous fluids demonstrated by Fleming (1940) makes it questionable whether better results could not be obtained by surgery combined with the administration of chemotherapeutic agents in sufficient amounts by the blood-stream. There is, moreover, growing evidence that various compounds applied direct to a wound produce a local foreign-body reaction in the tissues. The whole question is one requiring much critical study.

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ANGINA OF THE THROAT ASSOCIATED WITH MONONUCLEOSIS

By C. J. Fuller, D.M. Oxfd, M.R.C.P.
PHYSICIAN TO THE ROYAL DEVON AND EXETER HOSPITAL

From time to time reports have appeared of severe angina of the throat associated with a mononucleosis. Typical of these is a case published by Hartfall (1934). The explanation has been that they are unrecognised cases of the anginose type of glandular fever and until the advent of the Paul-Bunnell test (Paul and Bunnell 1932, Bunnell 1933) there could be little argument about it. The test has come to be regarded as diagnostic of glandular fever and therefore it was thought that the following five cases were worth recording. They could all have been regarded as instances of anginose glandular fever had not four of them shown either a negative Paul-Bunnell test or a titre which was below the diagnostic level. The tests were carried out at a period of the illness when they should have been positive if the patients had in fact been suffering from glandular fever. The technique used was that described by Stuart, Burgess, Lawson and Wellman (1934).

It has been found that certain other conditions may give a positive Paul-Bunnell test, and from the point of view of this series the most notable of these is serum sickness. A method of differentiating the two sheep-cell-agglutinating antibodies was discovered by Stuart and others (1936). They found that the antibodies produced in serum sickness were completely absorbed by emulsions of guineapig kidney, whereas those of infectious mononucleosis were not. Finally it has been found that normal human serum possesses a low titre of sheep-cell agglutinins and in order to differentiate this from a mild case of glandular fever Bailly and Raffel (1935) devised a method of treating the serum to be tested with beef cells which absorb the agglutinins of glandular fever but not those normally present.

The five cases described were all in children or young adults; all arose independently and there was no epidemic of glandular fever.

CASE-RECORDS

Case 1.—A married woman, aged 24. Seen first on July 15, 1938. For two months she had been feeling tired and listless, but this may have been because she had lately married against the wishes of her parents. A week previously she felt a lump in the left side of her neck. Since then she had been feverish and had complained of sore throat. She had had measles, german measles, chickenpox and whooping-cough.

On July 15 her temperature was 101° F., pulse-rate 96. There was enlargement of lymphatic glands on the left side of neck in both the anterior and posterior triangles. There was also an enlarged gland in the left axilla and the spleen was palpable. Her throat was injected with several small ulcers on the tonsils and fauces. A throat swab had been taken before I saw her and this showed a few "streptococci" but no diphtheria bacilli. The blood-count was:—

Red cells	5,300,000	Polymorphs	52%
White cells	11,200	Lymphocytes	39%
Hb.	84%	Eosinophils	0·5%
C.I.	0·8	Transitional neutrophils	1·5%
		Monocytes	7%

Slight anisocytosis of red cells, some of which show central pallor. No nucleated reds seen.

The Paul-Bunnell test was negative. The patient continued to be feverish. The report on a second throat swab taken on the 20th was: smear showed a few Vincent's organisms. On culture streptococci, slightly hæmolytic, 5%; *Streptococcus viridans* 85%; pneumococci 10%. The white-cell count on the 23rd was 12,500 (polymorphs 22%, lymphocytes 68·5%, eosinophils 0·5%, transitional neutrophils 0·5%, monocytes 3·5%, basket cells 4·5%, smear cells 0·5%). The red cells were normal. Many of the lymphocytes were indented and primitive in appearance. A Paul-Bunnell test was again negative as was a Widal reaction against typhoid, para A and B and abortus. The patient's temperature settled gradually and the glands returned to normal. The patient subsequently left the district, but a letter from her husband stated that she had a relapse soon after returning home with "an enlarged and inflamed gland" in her axilla.

Case 2.—A girl, aged 7 years. Seen on March 24, 1939. She had been ill with a severe sore throat for a fortnight. The family doctor said that the throat had become progressively worse in spite of treatment with sulphanilamide. A throat swab taken before she was seen by me was said to have grown hæmolytic streptococci. The temperature had been fluctuating, highest 103° F.

On March 24 there was a considerable amount of exudate on both tonsils which were swollen and red. In the neck the tonsillar glands and those in the posterior triangles were enlarged. Smaller glands were felt in the axillæ and groins. The tip of the spleen was palpable as was the edge of the liver. The heart and lungs were normal. No petechiæ. Gums healthy. The report on a throat swab was: No Vincent's organisms seen; no diphtheria bacilli grown; blood-trypsin-agar, streptococci, strongly hæmolytic in pure growth. The blood-count was:—

Red cells	3,920,000	Polymorphs	22·5%
White cells	38,000	"Lymphocytes"	76%
Hb.	65%	Eosinophils	0·5%
		Large mononuclears	0·5%

About 20% of the "lymphocytes" are small lymphocytes; the remainder include lymphocytic cells in varying stages of immaturity. Smear and basket cells have not been included in the differential count; these total about a third of the leucocytes present. There is anisocytosis of the red cells, and microcytes are present. Some of the red cells show slight central pallor, but the majority are well-filled with hæmoglobin. Polychromasia slight. Punctate basophilia occasional. No nucleated red cells seen.

A Paul-Bunnell test was not carried out. The child was put on another sulphanilamide derivative (M. & B. 693); the temperature fell and throat cleared rapidly. She made a good recovery.

CASE 3.—An unmarried man, aged 20, who was on leave from the Army. Seen on Oct. 21, 1939. He complained of a sore throat which had come on ten days before. This had become rapidly worse and had been treated with Streptocide by his family doctor, 0·5 g., having been given four-hourly for four days without response.

On Oct. 21st his temperature was 103·8° F., pulse-rate 92. The most noticeable symptom was the fœtor of the breath which was obvious on going into the sick-room. The boy's throat was grossly inflamed and swollen. The swelling involved tonsils, fauces and soft palate, and these areas were covered with a patchy exudate. The tongue was furred but not ulcerated, nor was there any ulceration or sponginess of the gums. Externally there was a collar of enlarged glands in the neck with considerable œdema of the soft tissues. The glands of the axillæ and groins were also enlarged but not to the extent of those in the neck. The spleen was palpable three finger-breadths below the costal margin. There were no abnormal signs in the heart or lungs. The patient was transferred the same day to the Royal Devon and Exeter Hospital.

A throat swab examined on the 22nd showed fusiform bacilli and coarse spirochætes. Culture showed no diphtheria bacilli but a mixed growth of streptococci of the hæmolytic and viridans type. He was given N.A.B. 0·2 g. intramuscularly on the 22nd and was ordered a throat paint consisting of Fowler's solution 1 in 4; no other treatment was given. The white-cell count on the 23rd was 29,000 (polymorphs 22%, lymphocytes 72%, transitional neutrophils 2%, monocytes 4%). Many of the lymphocytes appeared primitive, showing indented nuclei and larger cytoplasm than is usual. No lymphoblasts were seen.

A Paul-Bunnell test on the 23rd was negative. A sternal puncture carried out on the 24th showed normal findings, as follows:—

Red cells	4,010,000
White cells	64,000
Leucocyte-erythrocyte ratio	1:62

Promyelocytes	3·5%	Lymphocytes	6·5%
Neutrophil myelocytes	4%	Disintegrated cells	2·25%
Neutrophil segmented	6%	Megaloblasts	1%
Neutrophil non-segmented	25%	Early erythroblasts	9%
Eosinophil myelocytes	3·5%	Late erythroblasts	31·5%
Eosinophil segmented	1·75%	Normoblasts	6%

On the 25th the white-cell count was 45,200 (polymorphs 22%, lymphoblasts 0·5%, lymphocytes 76·5%, monocytes 1%). Many of the lymphocytes were primitive in appearance. Next day the white cells had fallen to 17,600 (polymorphs 22·5%, lymphocytes 76·5%, eosinophils 1%). Many of the lymphocytes had indented nuclei and were of primitive appearance. A second Paul-Bunnell test on the 29th was also negative. The patient made a rapid recovery, his temperature dropping to 99° F. in four days and finally settling in a week. The local signs cleared at the same time, but the blood-picture did not approach normal until at least a week later.

On Nov. 9th the blood-count was: red cells 4,840,000, Hb. 94% (Haldane), C.I. 0·97, white cells 14,800 (polymorphs 61%, lymphocytes 36·5%, eosinophils 0·5%, monocytes 2%). Apart from slight anisocytosis no abnormality of the red cells was detected. The enlarged spleen was the most persistent abnormal physical sign and this was still palpable when the patient was discharged on the 10th. He was seen once more three weeks after discharge; he had then lost all traces of his illness, the lymphatic glands having returned to normal and the spleen being no longer palpable. His blood-count was then: red cells 5,210,000, Hb. 102%, C.I. 1, white cells 12,400 (polymorphs 60·5%, lymphocytes 34%, eosinophils 3·5%, monocytes 2%). Some of the lymphocytes had irregular nuclei, but the red cells were normal in shape and size and well-filled with hæmoglobin.

CASE 4.—An unmarried woman, aged 21. Two days before the onset of the illness the patient had told her doctor that she felt very well. On Dec. 22, 1937, she complained of sore throat and had a temperature of 99·4° F., pulse-rate 80. Her general condition was good. Next day the temperature had risen to 100° F. and a membrane could be seen on both tonsils. Her breath was unpleasant. A throat swab taken on the 23rd showed fusiform bacilli and coarse spirochætes, and on culture non-hæmolytic streptococci in almost pure growth were found but no diphtheria bacilli.

On the 24th the throat was worse, and in view of a somewhat nasal voice and the general similarity of the case to diphtheria, 60,000 units of diphtheria antitoxin was given, in spite of the negative throat swab. On this day epistaxis was noted. The patient's condition rapidly deteriorated and by the 27th she had a waxy pallor with blue lips. She was apathetic. The breath was foul, tongue dry and brown, with sores on the lips, and the gums had become ulcerated. The temperature was 102° F., pulse-rate 112. The spleen could not be felt and there was no enlargement of the lymphatic glands.

Further throat swabs taken and examined on the 25th and 27th confirmed the findings of the first. The streptococcus was now found to be of the viridans type. No hæmolytic organisms were grown. On the 27th the blood count was:—

Red cells	4,490,000	Polymorphs	49%
Hb.	94%	"Lymphocytes"	41·5%
C.I.	1	Transitional neutrophils	1·5%
White cells	15,200	Lymphoblasts	6%
		Monocytes	1%
		Large mononuclears	0·5%
		Basophils	0·5%

No abnormality of the red blood-cells detected. No nucleated red cells seen. A number of the "lymphocytes" are primitive in type.

A Paul-Bunnell test on the 27th showed agglutination up to a dilution of 1 in 20. (The diagnostic titre is taken as 1 in 80.) It should be noted that the patient had 60,000 units of diphtheria antitoxin three days previously.

On the 29th the patient's condition had begun to improve, but she did not recover completely for another month. The ulcers on the gums took some time to heal and it was found necessary to give three injections of N.A.B. before this was complete.

A blood-film examined on Jan. 3, 1938, showed polymorphs 28%, "lymphocytes" 58·5%, eosinophils 1%, basophils 1%, lymphoblasts 6%, monocytes 2·5%, large mononuclears 1%, "smear cells" 2%. No abnormality of the red cells was detected and no nucleated red cells seen. A number of the lymphocytes were primitive in type.

On the 11th the white-count was 11,000 (polymorphs 52%, lymphocytes 42·5%, lymphoblasts 3·5%, monocytes 1·5%, large mononuclears 0·5%). A second Paul-Bunnell test done on the 11th was completely negative.

CASE 5.—An unmarried woman of 22, seen first on April 27, 1940. She had noticed swollen glands in her neck on April 18th. On the 22nd she had a sore throat, which rapidly became worse and next day she went to bed, her temperature being 100° F. She was seen by her private doctor who started sulphapyridine, but vomiting started soon afterwards and became so severe that the drug was stopped after 6 grammes had been given.

The patient had had diphtheria five years ago and two attacks of tonsillitis. Her tonsils had been guillotined at the age of seven, but the right one had been only partially removed.

On the 27th she was given 10,000 units of diphtheria antitoxin by her doctor. When I saw her she looked ill, and was able to speak only with difficulty, breathing through the mouth owing to nasal obstruction. Temperature 102° F., pulse-rate 124, respiration-rate 20. There were no petechiæ. The neck was swollen and œdematous with enlarged lymphatic glands. Enlarged glands were also palpable in the axillæ, but there were none in the groins. The heart and lungs were normal. The spleen was enlarged three finger-breadths

below the costal margin. The mouth and throat could only be examined with difficulty owing to pain and tenderness, but a swollen right tonsil could be seen covered with exudate which spread to the fauces and lateral pharyngeal wall. There was no ulceration or sponginess of the gums. The patient was transferred to the Royal Devon and Exeter Hospital. A blood-count on the 28th showed red cells 4,020,000, Hb. 72%, C.I. 0·9, white cells 23,200 (polymorphs 25%, lymphocytes 71·5%, monocytes 3·5%). Many of the lymphocytes had indented nuclei and deep-staining cytoplasm. There was some anisocytosis of the red cells, some microcytes being present. The red cells were well-filled with hæmoglobin. A few polychromatic cells were present. No nucleated red cells were seen. A throat swab on the same day showed Vincent's organisms in large numbers on the film. Cultures grew *Strep. viridans* with a few colonies of *Staphylococcus albus*, non-hæmolytic. No diphtheria bacilli. A Paul-Bunnell test on the 29th gave agglutination up to a dilution of 1 in 64.

On the 28th the patient was given streptocide in gramme doses every four hours; this was discontinued after 7 g. had been taken, for the absence of hæmolytic streptococci in the throat swab did not warrant its continuation. On the 29th she was given 0·2 g. of Stabilarsan intramuscularly and started on throat swabbings with 1% Fowler's solution. That night the patient was delirious and the next day incontinent of urine. A peritonsillar abscess had formed on the right side which was beginning to discharge spontaneously. The white-count on the 30th was 16,600 (polymorphs 30·5%, "lymphocytes" 66%, monocytes 3·5%). Many of the "lymphocytes" had indented nuclei and deep-staining cytoplasm. On May 1 a further 0·3 g. of stabilarsan was given and by the 3rd her temperature had dropped to normal and she was better in every way. Her white-count was then 9800 (polymorphs 35%, lymphocytes 62%, eosinophils 1·5%, monocytes 1·5%). Most of the lymphocytes were normal in appearance. A second Paul-Bunnell test on the 4th was negative. The improvement was maintained, but on her discharge two weeks after admission she still had slight enlargement of the tonsillar glands and a spleen whose tip could be felt.

DISCUSSION

The resemblance of these five cases to the anginose type of glandular fever is evident but there are several points of difference. The most striking difficulty in making this diagnosis is the result obtained with the Paul-Bunnell test. In cases 1 and 3 this was completely negative although carried out at the height of the disease, between the 7th and 12th days. In case 4 the first test was done on the 5th day, and it so happens that 60,000 units of diphtheria antitoxin had been given three days before. It seems reasonable to assume that the agglutination of 1 in 20 was due to the serum rather than to the disease, especially in view of the fact that a further test was negative. One is probably justified in taking a similar view in case 5, for here although agglutination occurred up to a dilution of 1 in 60 it was extremely transient. In addition it is suggested by the authors of the technique used for the test that a dilution of 1 in 60 is only suggestive of glandular fever, whereas a definite diagnosis cannot be made in a dilution of less than 1 in 80. In case 2 no Paul-Bunnell test was done, but the child improved suddenly with sulphapyridine, which is unusual in glandular fever.

The sudden onset of the condition, the evidence of involvement of the nose and the beneficial effect of specific treatment are all features of these cases which are atypical of glandular fever (Tidy 1937). However, the possibility of certain cases of glandular fever giving a negative Paul-Bunnell test must be entertained, for the exact nature of heterophil antibodies is not yet clearly understood and it is possible that the severity of the disease in the cases described may have prevented their formation.

Four of these cases had a heavy infection with Vincent's organisms, and the fact that arsenic caused such a rapid improvement in cases 3, 4 and 5 suggests that the throat infection was responsible for the toxic symptoms. Nevertheless it is difficult to attribute the whole illness primarily to a Vincent's infection, for these organisms are found repeatedly in undoubted cases of glandular fever (Paul 1932 and Bunnell 1933) and in this instance appear to have little effect on the course of the disease. It seems more likely that the Vincent's organisms were merely secondary invaders. If so and if a positive Paul-Bunnell test is necessary for a diagnosis of glandular fever some other unknown factor appears to be capable of producing a mononucleosis with a general hyperplasia of the lymphoid tissues, and a secondary infection of the throat may give rise to angina which responds to the appropriate remedy.

The differentiation between this condition and acute lymphatic leukæmia is of vital importance. The absence of purpura, spongy bleeding gums and severe anæmia are all points against acute leukæmia, and the fact that these cases respond to specific treatment settles the point. A true agranulocytic angina has also to be considered, but a blood-count will settle any doubt. Diphtheria can be excluded by the height of the temperature, the common presence of generalised lymphoid hyperplasia, the blood-count, and the result of the throat swab, and a severe streptococcal infection of the throat and tonsils is ruled out by the increase in mononuclear cells.

SUMMARY

Five cases are described which bear a resemblance to the anginose type of glandular fever.

In two the Paul-Bunnell test was negative. In two it was below the diagnostic level of titre and in the fifth it was not carried out.

Either one must accept the possibility that the Paul-Bunnell test is not always positive in glandular fever or the condition described is due to some factor as yet unexplained. It is characterised by a mononucleosis, a generalised lymphoid hyperplasia, and angina of the throat, and it responds well to treatment of the predominating organisms found in the throat.

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ANGINOSE GLANDULAR FEVER

By H. Stuart Barber, M.D. Dubl., M.R.C.P.I.
ACTING SQUADRON-LEADER, R.A.F.O.

The past year has seen the occurrence of epidemics of a mild form of "influenza" and measles, and during the same period a small epidemic of another presumed virus disease, polyradiculoneuritis, was reported. It was not perhaps surprising, therefore, that a mild outbreak of a fourth possible virus disease, glandular fever, should have made its appearance during the spring and early summer. Glandular fever has become comparatively common in recent years and its epidemiological character is well recognised. Three main types are described—glandular, anginose and febrile (Tidy 1937). Of these the anginose is regarded as much rarer than the others but seven of the eight cases in service patients reported here belonged to this group.

CLINICAL FEATURES

After a short prodromal period of 1–7 days during which the patients had shivering attacks, anorexia, nausea, and in one case diarrhœa, the throat became acutely inflamed and painful. On admission to hospital nothing to suggest a serious toxæmia was observed and the principal trouble was the angina. The breath was offensive, the tongue thickly coated and the throat congested, often with a white exudate on the tonsils and pillars of the fauces. The exudate bore no resemblance to the diphtheritic pseudo-membrane and was easily removed. In milder cases there was a simple

congestion, and in three deep ulceration of one or both tonsils could be seen. The temperature was but slightly elevated and although the throat was acutely painful constitutional symptoms were remarkably mild. Indeed the whole picture was suggestive of Vincent's angina but throat swabs were in all cases negative. Further examination revealed definite axillary and cervical adenitis. In two patients the spleen was palpable; the inguinal glands were definitely enlarged in only one case. The skin over the enlarged glands was healthy and they were discrete and of normal consistence. They were rarely painful and the tenderness when present was slight. Blood examination showed a high proportion of monocytes and lymphocytes but an increase in the total white-cell count was the exception rather than the rule. The red-cell count was normal. The Paul-Bunnell test gave a positive reaction in all cases. Exanthemata, which are found more often in the febrile type, were not observed. All patients made a complete recovery without any of the described complications, which are stated to be conjunctivitis, hæmaturia, jaundice, meningitis and pressure symptoms. No particular treatment was found to be helpful. Local applications to the throat while comforting to the patient were clearly not efficacious in hastening resolution.

The condition must be differentiated from three others. Diphtheria shows more severe constitutional symptoms, and there is a definite pseudo-membrane and leucocytosis in which granulocytes predominate. Vincent's angina is recognised by the presence of the spirillum in a direct smear from the throat and by the absence of the characteristic blood changes of glandular fever. Lymphatic leukæmia may lead to confusion in the early stages, but later the steady downward course with the development of anæmia and hæmorrhages will leave no doubt.

CASE-RECORDS

CASE 1.—A man aged 21 was admitted to hospital on April 19 complaining of severe sore throat and acute pain on swallowing. Temperature 99·2° F., pulse-rate 84. Breath foul and tongue coated. Pharynx severely inflamed and right tonsil much enlarged, covered with purulent exudate and deeply ulcerated. Cervical glands enlarged but not tender. Edge of spleen palpable. This was the first case seen, and a tentative diagnosis of Vincent's angina was made, but the throat swab was negative. A blood-count left little doubt as to the correct diagnosis. Red cells, 5,450,000; white cells, 10,200 (polymorphs 22%, lymphocytes 65%, monocytes 11%, eosinophils 2%. Blood-serum on April 25 gave a positive agglutination reaction with sheep's red cells in a dilution of 1 : 320. Differential white-cell counts on succeeding dates were as follows:—

	May 6	*May* 8	*May* 13
Polymorphs (per cent.) ..	30	52	55
Lymphcoytes ,, ..	64	42	36
Monocytes ,, ..	4	5	6
Eosinophils ,, ..	2	..	2
Basophils ,, ..	..	1	1

The throat slowly improved. When the patient was discharged on May 27 the throat was healed, the spleen was no longer palpable but a few glands could still be felt in both axillæ.

CASE 2.—A man aged 22 was admitted to hospital on May 3. On April 22 he had begun to feel listless and easily tired, with some nausea and anorexia. The bowels had been rather loose. A week later he had developed a severe sore throat and been sent to bed, where he remained till transferred to hospital. Temperature normal; tongue dry and coated with brown fur. White exudate on the tonsils but no ulceration. Generalised painless enlargement of the cervical and axillary lymph-glands. Spleen not palpable and no rash. Next day the temperature rose sharply to 100·2° F. and remained elevated for 5 days. May 4, white cells 27,600 (polymorphs 12%, lymphocytes 71%, monocytes 16·5%, basophils 0·5%). Blood-serum on May 5 gave positive Paul-Bunnell reaction in a dilution of 1 : 1280. May 12, white cells 9800 (polymorphs 16%, lymphocytes 68%, monocytes 16%). The patient was discharged on May 27. The glands were still palpable but had decreased in size.

CASE 3.—A man aged 21 was admitted to hospital on May 18. Five weeks before he had injured his right knee at football and was sent for further investigation. Temperature 99° F., pulse-rate 68. Synovitis in right knee. Three days after admission he began to complain of sore throat which he stated had been present for some time and which had become worse recently. He was transferred to the medical division. Tonsils showed some follicular inflammation. Cervical and axillary glands palpable and tender. Spleen and liver not palable. May 23, white cells 6800 (polymorphs 20%, lymphocytes 56%, monocytes 10%, basophils 1%). Blood-serum on May 30 gave positive Paul-Bunnell reaction in a dilution of 1 : 80, and also positive ox-cell absorption test. May 28, white cells 9600 (polymorphs 28%, lymphocytes 56%, monocytes 15%, eosinophils 1%). During this time the temperature became remittent but returned to normal within a few days. The effusion into the knee-joint slowly absorbed and when he was discharged on June 10 the glandular enlargement had disappeared.

CASE 4.—A man aged 18 was admitted to hospital on June 3 complaining of sore throat. Temperature 101° F., pulse-rate 100. Tonsils congested and covered with exudate. Cervical glands enlarged and tender; some painless glands in both axillæ. White cells 10,800 (polymorphs 12%, lymphocytes 83%, monocytes 5%). Blood-serum on June 12 gave positive Paul-Bunnell reaction in dilution of 1 : 1280. Two days later the temperature and pulse-rate had become normal and the throat was much improved. Leucocyte counts on succeeding dates were:—

	June 15	*June* 24
White cells	9600	10,000
Polymorphs (per cent.) ..	34	40
Lymphocytes ,, ..	56	43·5
Monocytes ,, ..	8·5	8
Eosinophils ,, ..	1	..
Basophils ,, ..	0·5	..

When he was discharged on June 26 there were still some palpable but painless glands. The spleen was never enlarged.

CASE 5.—A man aged 21 was admitted to hospital on June 10. Fourteen days before he had developed a cold and sore throat and had been in bed for 5 days. On the first day that he was up he had sunbathed and been severely burned. As the throat did not improve he was sent into hospital as soon as the sunburn was better. Temperature 99·8° F., pulse-rate 92. Pharynx slightly inflamed. Numerous palpable and tender glands in posterior triangles of neck and some painless glands in both axillæ. Spleen and liver not palpable. No rash observed. White cells 8000 (polymorphs 12%, lymphocytes 76%, monocytes 12%). Paul-Bunnell reaction on June 11 positive to a titre of 1 : 1280. He was discharged on June 25.

CASE 6.—A medical officer was admitted to hospital on July 25. He had noticed a white patch on the right tonsil a fortnight before admission. At this time there had been no soreness or pain on swallowing. On July 11 the throat had become painful and next day there was ulceration of the right tonsil. His temperature was then 100° F. and he retired to bed. He treated himself with sulphanilamide, gr. 15 four-hourly, and with gargles. On the 14th there was some improvement and the sulphanilamide was discontinued. A throat swab on the 16th showed hæmolytic streptococci and a few *Bacillus fusiformis*. He returned to duty. On July 22 there was a relapse, both tonsils showing a patchy exudate. Sulphapyridine was tried but since there was no improvement he was transferred to hospital. Temperature 99° F. Both tonsils much enlarged and covered with exudate. Bilateral cervical adenitis; axillary and inguinal glands also enlarged. Spleen not palpable and no rash. White cells 17,400 (polymorphs 19%, lymphocytes 71%, monocytes 9%, basophils 1%). Throat swab showed *B. fusiformis* in large numbers. Blood-serum on July 30 agglutinated 1/10 sheep cells to a dilution of 1 : 640. None of the sulphanilamide group of drugs was used after admission. Progress was uneventful and he was discharged on July 6.

CASE 7.—A man aged 20 was admitted to hospital on Aug. 21. On Aug. 13 he had been struck on the head and 2 days later he had noticed that his neck was swollen. On the 18th he complained of sore throat and pain on swallowing. Temperature 102·2° F., pulse-rate 86. He appeared somewhat toxic. Obvious enlargement of postauricular, submental and axillary glands. Spleen also enlarged. No rash. Ulceration of both tonsils. Throat swab showed normal saprophytes of the mouth. White cells 13,600 (polymorphs 16%, lympho-

cytes 31%, monocytes 49%, basophils 1%). The temperature remained elevated for about 7 days swinging from 99° F. to 102° F. and returning to normal by lysis. Blood-serum on Aug. 25 gave a positive Paul-Bunnell reaction in a dilution of 1 : 1280. White-cell counts on succeeding dates were :—

	Aug. 30	*Sept.* 3
White cells	8800	9000
Polymorphs (per cent.) ..	28	64
Lymphocytes ,, ..	50	25
Monocytes ,, ..	21	11
Eosinophils ,, ..	1	0

When he was discharged on Sept. 12 the spleen and glands were no longer palpable.

CASE 8.—This case had no angina and belonged probably to the glandular type. A man aged 24 was admitted to hospital on July 28 complaining of malaise and shivering attacks. Temperature and pulse-rate normal. Throat healthy. Some enlarged but painless glands in neck and both axillæ. Spleen not palpable and no rash. On the morning after admission the temperature rose to 100° F., continued remittent for 3 days and thereafter settled to normal. On Aug. 3, white cells 14,000 (polymorphs 33%, lymphocytes 56%, monocytes 10%, eosinophils 1%). Blood-serum on July 31 agglutinated 1% sheep's red cells to a titre of 1 : 80. He was discharged on Aug. 7.

DISCUSSION

The infectivity of the condition is low since all but two of the patients came from different units and no evidence of contact could be established. In none of the accounts consulted is the ulceration of the tonsils stressed although it is mentioned as a complication in one of the descriptions (Atkinson 1939). It was the outstanding feature of some of my cases and remarkable for its resistance to all forms of treatment. The sulphonamide group of drugs was not used because the granulocytes were reduced. It is generally stated that the absolute number of granulocytes is not much affected in this condition except in the early stages, when there is often a leucocytosis. In this series leucocytosis was not usual and the number of granulocytes ranged from the average normal of 4000 to 960 per c.mm. This was also the finding in cases recently reported (Dewar 1939, Lemierre 1939, Pietzonka 1939). There is therefore not only a relative but an absolute decrease in the number of granular cells in many cases. The severe ulceration of the tonsils is probably part of the lymphatic involvement but it may be aggravated by the granulopenia. Lymphatic involvement was not general; in many cases the inguinal glands were not enlarged and the spleen was rarely palpable; the epitrochlear gland was not enlarged in any of them. The occasional intestinal symptoms—vomiting, constipation and diarrhœa—have been attributed by some to the enlargement of the mediastinal glands. In a disease which affects the lymphatic tissues, however, enlargement of the Peyer's patches of the ileum may so stimulate peristaltic movements as to produce diarrhœa. Finally, in the words of Professor Lemierre, "It is very probable that a great many of the so-called cases of Vincent's angina are nothing else than monocytic angina."

SUMMARY

A small outbreak of glandular fever is described. In three of the eight cases there was ulceration of the tonsils. All showed a high proportion of monocytes and lymphocytes, and in most there was an absolute reduction in granulocytes. The Paul-Bunnell test was invariably positive.

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CHRONIC BENZENE POISONING

BY J. L. HAMILTON-PATERSON, M.D. Lond.
PATHOLOGIST TO THE REDHILL COUNTY HOSPITAL, EDGWARE

UNDER the regulations, drawn up in 1922, which govern the conditions for the manufacture of indiarubber and articles made wholly or partially of indiarubber persons employed in a "fume process" involving the use of benzene and certain other solvents have to be examined medically every month. This paper records a series of clinical and hæmatological examinations in a group of women exposed to benzene fumes.

Benzene is a fairly common industrial solvent and though some cases of chronic poisoning may progress to complete recovery others show a continued residual abnormality of the blood (Selling 1916, Hamilton 1931). Cases 2 and 3 appear to belong to this group, one having a hyperchromic anæmia and the other a hypochromic anæmia, both severe enough to cause disability. Early diagnosis and removal from exposure are therefore imperative. Laboratory examinations, particularly blood counting and the estimation of organic sulphate in the urine, are a great help in diagnosis, and where possible should be done as a routine.

The conditions of work for the cases described were as follows: a rubber solution made of "benzol 90's" (commercial 90% benzene) and petroleum spirit was used on bench work (see table, process A) in a large room with natural ventilation assisted by extraction fans. About 5 months ago the use of benzene was eliminated from this process. Nearby, at another bench, rubber solution of the same composition was used for another process (process B in table). The "B" workers were probably working in a higher concentration of benzene than the "A."

CASE-RECORDS

CASE 1.—A woman of 30, 6 months pregnant. For 16 weeks before admission to hospital on April 28, 1940, her work had involved the use of benzene and petroleum rubber solution (process A). She had no previous history of working with benzene. Evening vomiting for 3 months, possibly associated with the pregnancy; vomit occasionally streaked with blood. Had passed blood from rectum 7 days before admission; no pain; no purgatives taken.

She was pale, and had purpuric spots on neck, wrists, arms and lower limbs, and ecchymoses on feet (6 days' history). Gums spongy and bleeding (8 weeks' history); no glossitis. Blood-pressure 90/40. Capillary breaking-point test produced 35 petechiæ on the arm. April 29, red cells, 1,160,000; Hb. 28%; colour-index 1·21; white cells 1200 (polymorphs 20%, lymphocytes 80%); bleeding time more than 15 min.; coagulation time (Dale and Laidlaw) 1 min. 45 sec. Continuous drip blood-transfusion started (4 pints). April 30, red cells 2,520,000; Hb. 50%; C.I. 1; white cells 1400 (polymorphs 20%, lymphocytes 80%); platelets 30,000. May 2, much altered blood in stool; fœtor oris. May 3, red cells 1,700,000; Hb. 36%; C.I. 1·07; white cells 444; film showed only an occasional lymphocyte; no platelets. May 4, intravenous drip blood-transfusion (6 pints). May 5, red cells 2,960,000; Hb. 62%; C.I. 1·05; white cells 500. May 6, red cells 3,300,000; Hb. 70%; C.I. 1·06; white cells 444. May 8, in labour; delivered of a normal 24 weeks fœtus. White cells 190; film showed only lymphocytes; platelets 20,000. The patient died next day.

At autopsy she was found to have a petechial rash on the arms and abdomen; skin slightly jaundiced. Small groups of petechiæ beneath the visceral pericardium at the base of the heart, and a few petechial hæmorrhages in the interlobular fissures of the lungs. Liver a little enlarged and greasy; an area 2 in. in diameter of extreme pallor in substance of left lobe. On microscopic examination the cells round the central veins were found to be swollen and filled with yellow pigment; no true necrosis; sinusoids dilated, containing many swollen Kupffer cells. Kidneys pale with large hæmorrhages in both pelves; the wall of the right ureter was blackened with confluent submucous hæmorrhages. A few petechiæ in the bladder. The uterus was enlarged and contained blood-clot; the cervix was four-fingers dilated. Both ovaries enlarged and filled with small hæmorrhagic cysts. Large intestine filled with melæna stool; no ulceration of mucosa. The

TABLE I—SUMMARY OF REMAINING 18 CASES

Case	Sex	Age	Process	Time on process	Symptoms	Date	Hb. %	R.B.C. (millions)	C.I.	W.B.C.	Polys %	Lymphs %	Monos %	Eosin %	Baso %	Platelets
4	F	40	B	2½ mths.	Felt sick at first. Swelling of feet. Poor appetite. M.P. 5–6/28–31; period delayed 14 days at beginning of work.	15/5/40	80	4·4	0·90	5000	60	36	3	1	0	Abundant
						18/6/40	86	4·5	0·97	4600	57	31	3	9	0	,,
5	F	30	B	3½ mths.	M.P. irregular; last three mths. 4/14. Looks pale.	15/5/40	81	4·0	1·02	10,300	63	32	3	2	0	Scanty
6	F	18	B	5½ mths.	Tonsillitis. M.P. 3/28–35; missed one period when work started. Sallow. Losing weight.	15/5/40	92	4·5	1·03	8500	58	33	4	4	1	Abundant
7	F	46	A	3½ mths.	M.P. 3/28. Slight giddiness. Lost 7 lb. since work started. Legs swell.	15/5/40	74	4·5	0·82	7600	44	48	2	6	0	Scanty
									Slight anisocytosis.							
8	F	31	B	3½ mths.	M.P. 7–8/21–25. Loss of weight and cough.	15/5/40	102	5·2	0·96	6000	31	53	7	9	0	Abundant
			A	2 mths.												
9	F	35	A	3½ mths.	M.P. formerly 4/28; last 3 mths. 4/21.	15/5/40	88	4·3	1·02	4400	25	63	2	10	0	,,
						18/6/40	91	4·3	1·05	4000	53	33	8	6	0	,,
10	F	35	B	2½ yrs.	Pale. Feels well. M.P. 5–6/30. Infant 9 mths. old. Absent from work 6 mths.	20/5/40	79	4·4	0·89	5500	56	38	6	0	0	,,
									Some hypochromia.							
11	F	—	B	1½ yrs.	M.P. 2–3/26–27.	20/5/40	78	3·6	1·08	7000	63	30	6	1	0	Scanty
12	F	20	B	2 mths.	Acne on face. Seborrhœic scalp. M.P. 6/28. No change.	20/5/40	86	4·2	1·02	4900	53	39	8	0	0	Abundant
13	F	19	B	2½ mths.	M.P. 5/28. No change.	20/5/40	89	4·8	0·93	5000	63	28	4	5	0	Scanty
						18/6/40	84	4·0	1·05	2500	61	27	6	5	1	,,
14	F	36	B	3 mths.	M.P. 4/28. No change.	20/5/40	100	4·8	1·04	8000	71	19	8	2	0	Abundant
			A	6 wks.												
15	F	41	A	3½ mths.	Amenorrhœa before benzole exposure. No symptoms	22/5/40	84	4·3	0·98	6600	53	40	5	1	1	,,
16	F	22	A	3½ mths.	M.P. 3/28. No change.	20/5/40	98	4·9	1·0	4400	59	36	3	2	0	,,
17	F	29	A	6 wks.	M.P. 5/28. No change.	21/5/40	92	4·8	0·96	5600	63	29	7	1	0	,,
18	F	42	A	3½ mths.	Amenorrhœa since Nov. 1939, before this work began.	22/5/40	82	3·9	1·05	5800	69	22	7	2	0	,,
19	F	47	A	3½ mths.	M.P. 4–7/28–30. No change. Morning heaviness. Bleeds easily.	21/5/40	82	4·1	1·0	3300	48	43	5	4	0	Scanty
						18/6/40	82	4·0	1·02	3600	48	36	12	4	0	Abundant
20	F	—	B	2½ yrs.*	One attack of epistaxis. M.P. 6–7/28.	6/6/40	84	4·0	1·05	4000	34	55	3	8	0	,,
						16/7/40	92	4·5	1·02	7000	51	41	4	4	0	,,
21	F	38	B	2 yrs.	No symptoms. Now pregnant.	8/6/40	100	5·84	0·86	3200	52	44	4	0	0	200,000 per c.mm.

* With 10 months' interval. M.P. = menstrual periods.

upper half of the shaft of the right femur was filled with gelatinous red marrow in which small patches of yellow marrow were embedded. On microscopic examination the marrow contained few cells, those found being mostly large with a large nucleus containing nucleoli; no myeloid or immature red cells seen.

The fœtus was normal.

CASE 2.—A woman of 37, who had previously been employed only in housework, had started work with rubber solution (equal parts of carbon tetrachloride and benzene) just over 2 years before she attended hospital; 6 months later she had nose-bleeding, giddiness and dryness of the throat. Her blood was examined by her own doctor and she was away from work for 4 months, and was treated with Anahæmin. On return to the same work she complained of pains in the legs; nose-bleeding recurred. Gave up work for a short time but returned to a position in which she had no actual contact with rubber solution but could still smell it. Left this work finally on May 30, 1940.

Seen as an outpatient on May 24, having been diagnosed as a case of pernicious anæmia which had failed to respond to treatment. Her colour was good; no abnormal signs on physical examination. May 25, red cells 2,960,000; Hb. 78%; C.I. 1·32; white cells 3000 (polymorphs 45%, lymphocytes 51%, monocytes 3%, eosinophils 1%); some polychromasia. May 27, 4 c.cm. anahæmin given intramuscularly. June 3, red cells 2,880,000; Hb. 62%; C.I. 1·09. Complained of feeling tired. June 14, red cells 2,900,000; Hb. 67%; C.I. index 1·1; white cells 4000 (polymorphs 61%, lymphocytes 30%, monocytes 4%, eosinophils 4%, basophils 1%).

CASE 3.—A woman of 43 was employed as a daily worker, but for over 2 years had worked in the same room as benzene workers and could always smell benzene, though she did not handle it. She was seen on Aug. 7, 1940 complaining of giddiness, lassitude and loss of weight for 2 months. She had had two attacks of epistaxis, and had noticed a few petechial hæmorrhages on her skin during her last menstrual period; this had lasted for 12 days and been accompanied by low backache; her customary periods were regular, lasting 4 days. She had had a cough for 2 years but no hæmophysis; radiogram of chest 2 years previously had been normal.

She was thin and pale, with pigmentation of the face and arms but not of the mucosæ. Scattered râles and rhonchi at the lung bases; spleen palpable 1½ in. below costal margin. July 2, red cells 5,180,000; Hb. 50%; C.I. 0·49; white cells 5600 (polymorphs 42%, lymphocytes 48%, eosinophils 5%, monocytes 2%, basophils 3%); anisocytosis and much hypochromia; platelets scanty; no immature cells seen. Put on iron. July 9, ratio of inorganic to organic sulphate in the urine 96 : 4. Red cells 4,800,000; Hb. 52%; C.I. 0·54; white cells 5000 (polymorphs 45%, lymphocytes 48%, monocytes 6%, eosinophils 4%); anisocytosis, polychromasia and hypochromia; moderate number of platelets seen. Aug. 6, red cells 5,800,000; Hb. 58%; C.I. 0·6; white cells 5700 (polymorphs 75%, lymphocytes 21%, eosinophils 4%). On Aug. 10, transfusion of 1 pint of blood given. Aug. 20, red cells 5,100,000; Hb. 62%; C.I. 0·6; white cells 4800 (polymorphs 60%, lymphocytes 37%, monocytes 1%, eosinophils 2%); anisocytosis and poikilocytosis; platelets 357,000 per c.mm.; bleeding time 3½ min. Aug. 26, end of a normal four-day menstrual loss. Aug. 27, red cells 5,100,000; Hb. 66%; C.I. 0·64; white cells 6900 (polymorphs 44%, lymphocytes 52%, eosinophils 3%, basophils 1%); anisocytosis, poikilocytosis and polychromasia. Aug. 28, bilateral salpingo-oöphorectomy and total hysterectomy; uterus enlarged by fibro-adenomata to the size of a ten-weeks pregnancy; no large fibroids present. Pain in the back was attributed to the uterine condition but the severe anæmia could not be put down to excessive uterine hæmorrhage because there had been only one abnormal period.

The remaining cases are summarised in table I. All are women and the nature of the work and duration of exposure are indicated. After the first blood-count all those thought to be suffering from benzene poisoning were taken off that work. We had intended to repeat the blood-counts after 28 days but several of the women had obtained other employment. The platelets unfortunately were not counted but are reported from the

films as either abundant or scanty. The blood-counts were all collected in mid-morning.

DISCUSSION

Benzene has a destructive action on the bone-marrow, and aplasia may ensue; any of the cellular elements may be affected and a large variety of findings are reported. Leucopenia is the commonest of these, but leukæmia may develop either as an acute or chronic myelogenous form, as reported by Weil (1932). Anæmia usually occurs later in the disease, and most observers report a mild type with a low colour-index, but a severe hyperchromic type has been described by Dimmel (1932) and Weil (1933). The common leucopenia may progress to complete agranulocytosis, as in our first case.

Winslow (1927) summarised the findings of the National Safety Committee on benzole (1926) and gave the following blood-picture criteria for the diagnosis of chronic benzene poisoning in exposed persons: leucocyte count below 5500 and a reduction of polymorphs to less than 60%. Hunter (1939), after studying many cases, gave the following figures: red cells less than 4,500,000 or more than 5,200,000; absolute number of polymorphs less than 4500 or more than 7700 (in the early stages of chronic benzene poisoning leucocytosis may be the significant feature); eosinophils more than 3% (Dimmel, 1932–33, and others have reported eosinophilia); the presence of young polymorphonuclear forms, myelocytes or nucleated red cells, as described by Gall (1938). Before these standards can be used one must define the normal blood-count, with which they are to be compared. In my own relatively short experience the text-book figures for hæmoglobin and red cells are too high for the average adult female of the poorer classes of an industrial population. Hæmoglobin figures (Haldane) between 80 and 85 with corresponding low red-cell counts and a colour-index between 0·95 and 1·03 are often encountered in otherwise apparently healthy women, and I have used these figures as the lower limits of normal.

In table II a plus sign represents an abnormal finding and it is suggested that when there are three or more plus signs a diagnosis of chronic benzene poisoning should be considered; but it must be borne in mind that many cases of undoubted benzene poisoning may show only one or two abnormal findings, though these are usually striking. In the table, 3 women have normal counts without symptoms (cases 14, 17 and 18). Case 5 has suggestive symptoms but no abnormality of the blood. Cases 11, 12, 13, 15 and 16 have no symptoms and show only minor variations from normal in the counts. Case 10 has no symptoms but definite blood changes. The remaining 11 cases have symptoms and more or less well marked alterations in the blood count. It will be seen from the figures at the foot of the table that abnormalities of the white-count are much more frequent than anæmia. A series of 14 other women who were working at the same factory were questioned and 6 had symptoms which might be due to benzene. Unfortunately no counts could be made.

The chief symptoms were: giddiness (5); menstrual disturbances (4); epistaxis (2) and watering of the eyes (2); nausea, morning heaviness, swelling of the legs and lassitude. Smith (1928) gives the symptoms in women in the following order: headache, fatigue, dizziness, nausea, anorexia, weakness, nervousness, numbness and tingling, frequency of micturition, epistaxis, disturbed sleep, indigestion, menstrual disturbance, dyspnœa, skin eruptions, vomiting, abdominal pain. Any of these may arise without worrying the patient unduly, but they should lead to an immediate investigation if there is, or has been, exposure to benzene, since irreparable damage may occur without the patient feeling really ill.

Meda (1922), Hamilton (1925) and Smith (1928) say that there is an increased susceptibility to benzene poisoning during pregnancy. Case 1 of this series was 24-weeks pregnant and aborted immediately before death. Case 21 is now about 18-weeks pregnant. It would seem justifiable to prohibit the employment of pregnant women in work involving exposure to benzene.

Benzene is chiefly absorbed by inhalation; Lehmann and his colleagues (1910) say that 80–84% of the vapour in the air may be so absorbed. According to Feil (1933) 90% of this is excreted in the lungs. The remaining 10% is oxidised in the body to phenolic products which are conjugated with sulphates in the liver and excreted as such in the urine. In this manner the organic portion of the total sulphates is increased and the ratio of inorganic to organic sulphate decreased. Schrenk and his colleagues (1936) gave the lowest ratio in normal humans as 81 : 19. Kammer and his colleagues (1938), in 2 normal people, found it as low as 77 : 23, but they state that in all the others examined the inorganic sulphate was more than 80%. Many writers suggest that this estimation should be used as a routine on all benzene workers, for as a decrease of inorganic sulphate below 77–80% of the total sulphates would indicate that benzene was being absorbed in significant quantities. The urinary sulphates of 3 women in this series were estimated by the method of Peters and Van Slyke (1932). Case 13, one month after cessation of exposure to benzene, gave a ratio of inorganic to organic sulphate of 55·5 : 44·5. In case 19, one month after exposure, the ratio was 64·5 : 35·5. Case 3, four months after exposure showed a ratio of 94 : 6. These figures indicate that in the first 2 cases benzene was still being excreted a month after absorption had stopped. In the third case excretion had apparently stopped within four months.

TABLE II—SUMMARY OF FINDINGS IN 20 PERSONS EXAMINED
+ = abnormal finding; 0 = normal finding

Case	Anæmia		W.B.C. less than 5500	Polys less than 60%	Eosins more than 3%	Symptoms	No. of abnormal features
	Hypochrom.	Hyperchrom.					
2	0	+	+	+	0	+	4
3	+	0	+	+	+	+	5
4	0	0	+	+	+	+	4
5	0	0	0	0	0	+	1
6	0	0	0	+	+	+	3
7	+	0	0	+	+	+	4
8	0	0	0	+	+	+	3
9	0	0	+	+	+	+	4
10	+	0	+	+	0	0	3
11	0	+	0	0	0	0	1
12	0	0	+	+	0	0	2
13	0	0	+	0	+	0	2
14	0	0	0	0	0	0	0
15	0	0	0	+	0	0	1
16	0	0	+	+	0	0	2
17	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0
19	0	0	+	+	+	+	4
20	0	0	+	+	+	+	4
21	0	0	+	+	0	+	3
Totals	3	2	11	14	9	11	50

The following features of chronic benzene poisoning should be borne in mind during the examination of exposed workers:—

1. The initial symptoms in benzene poisoning are slight and easily overlooked. Only when combined with a history of exposure to benzene and an abnormal hæmatological picture, do they assume significance.

2. The patient may exhibit well-marked symptoms and signs pointing to some other diagnosis. Robert-Levy (1935) has stated that leucopenia in benzene poisoning may progress to complete agranulocytosis, indistinguishable from true agranulocytic angina except for a history of exposure to the poison. In case 1 of this series a tentative diagnosis of agranulocytic anæmia was made on admission to hospital. Not till after death was it found that the patient had been recently exposed to benzene fumes. Case 2 had been treated for two years as a case of pernicious anæmia. Failure to respond to treatment led to further investigations and a prolonged history of exposure to benzene was obtained.

A non-toxic substitute for benzene can usually be found. Where for technical reasons this is not possible the ventilation of the rooms in which benzene is used should be such that the fumes from the process are effectively removed.

SUMMARY

Three cases of chronic benzene poisoning are described and the hæmatological pictures of eighteen fellow-workers are given.

The diagnosis of benzene poisoning can be missed if the occupational history is not investigated and if only one type of blood picture is looked for. The blood may show: either anæmia or polycythæmia, leucopenia or

leucocytosis; a relative decrease or increase of polymorphs; eosinophilia. The commonest findings, however, are leucopenia and anæmia.

Any menstrual disturbance is suggestive.

The ratio of inorganic to organic urinary sulphates is decreased. Urinary sulphate estimation is valuable during, and up to a month after, the period of exposure to benzene.

Residual changes in the blood picture may persist indefinitely and may be accompanied by disability.

I wish to thank the Factory Department of the Home Office (now the Ministry of Labour and National Service) for their help in collecting the cases and providing data on working conditions. Dr. G. H. Jennings has kindly allowed me to publish the clinical reports of cases 1, 2 and 3.

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A CASE OF PICK'S SYNDROME

By Constance Shaw, M.B. Lond.
FORMERLY HOUSE-PHYSICIAN AT ST. GILES HOSPITAL, L.C.C.

Recurrent ascites, requiring frequent aspiration, is the common clinical finding in constrictive pericarditis. Œdema may be absent or slight, and the general condition of the patient remains good until the final cardiac breakdown occurs. The following case is unusual in origin, history and course.

CASE-RECORD

A housewife, aged 47, was admitted to St. Giles Hospital on June 19. She had always been healthy apart from suppurative peritonitis twenty-nine years before. Five weeks before admission she had begun vomiting after food; this stopped after a fortnight, and then her thighs began to swell. The swelling gradually spread down her legs, reaching her ankles and feet after a few days, when it became stationary. She felt well and had a good appetite.

She was well nourished with a good natural colour. There was gross œdema of the legs, lower abdominal wall, both breasts and the back as far up as the tenth dorsal spine. She had bilateral pleural effusions, the right greater than the left, and some ascites. The heart seemed normal; the pulse was very small; blood-pressure 118/100. The right effusion and the ascites were tapped. On July 8 she showed slight cyanosis and venous hypertension. On July 27 drainage was begun with Southey's tubes; 22 pints of fluid were removed, and the œdema cleared up and did not recur. Her general condition gradually deteriorated; the right foot became infected. She developed congestive failure with cyanosis, tender enlargement of the liver and suppression of urine. She died on Aug. 24.

The following *investigations* were carried out during her illness. Radiography showed the heart to be normal in size. Red cells 7,300,000, Hb. 130%. Blood-urea 34 mg. per 100 c.cm. Plasma-protein on June 20, total 8·8%, albumin 7%, globulin 1·8%; on July 24, total 5·2%, albumin 3·9%, globulin 1·3%. Blood-cholesterol 104 mg. per 100 c.cm. Urine: albumin present for the first week, otherwise normal. Urea concentration test: first hour, 15 c.cm., urea 3%; second hour, 25 c.cm., urea 2·6%; third hour, 30 c.cm., urea 3·8%. Ascitic fluid, protein 0·95% (transudate); pleural fluid, protein 0·65% (transudate); œdema fluid, protein 0·56% (transudate). Electrocardiogram, low voltage but otherwise normal. Circulation-rate 23 sec. by sodium-cyanide method (normal limits 16–21 sec.).

Post-mortem findings.—Petechiæ over chest and breast; no œdema; stomach showed severe gastritis due to heart failure; numerous old fibrous adhesions throughout peritoneal cavity; 2 pints of free fluid in peritoneal cavity; old fibrous adhesive pericarditis; pericardium firmly attached all over heart, with numerous old fibrous adhesions to diaphragm and lungs; slight hypertrophy and dilatation of right auricle and ventricle; small pleural effusions, ½ pint each; old mediastinitis and basal adhesions to diaphragm; lungs showed early brown induration and some œdema; spleen and kidneys congested; liver, early congestive changes.

Histology.—The pericardium showed dense hyaline fibrosis with some areas of degeneration but no calcification or cholesterol clefts, though there was some longitudinal splitting. There was also some scattered chronic inflammatory round-cell infiltration, chiefly lymphocytic. A fairly broad zone of subpericardial fat separated the pericardium from the myocardium.

DISCUSSION

I suggest that acute pericarditis may have followed the acute suppurative appendicitis and general peritonitis which the patient had twenty-nine years earlier, that the infection reached the pericardium by direct or lymphatic spread through the diaphragm, and that the patient's condition at that time was such that the pericarditis was overlooked. Remarkable features are the long interval between the supposed cause of pericarditis and the cardiac breakdown, the small ascites and the absence of recurring attacks of cardiac embarrassment. For ten weeks after the onset of œdema she remained otherwise well; the breakdown occurred suddenly, three weeks after tapping, when she was apparently improving.

In the light of the post-mortem examination it is possible to see which clinical findings might have led to early and accurate diagnosis. These were (1) the good health of the patient, (2) the history of œdema beginning in the thighs; (3) slight venous engorgement with compensatory polycythæmia, small pulse and absence of other abnormal cardiac signs; (4) low-voltage electrocardiogram; (5) low systolic blood-pressure and low pulse-pressure; and (6) transient albuminuria and fall in serum proteins as the disease progressed. Such cases may be commoner than is usually supposed, and in all cases of œdema where the usual causes have been excluded constrictive pericarditis should be considered. In this case surgical treatment might have been successful had the condition been recognised in time.

I wish to thank Dr. Terence East and Dr. G. A. Kiloh for their help; Dr. C. C. Bryson for the histological findings; and Dr. Allen Daley for permission to report the case.

TRAUMATIC STREPTOCOCCAL MENINGITIS

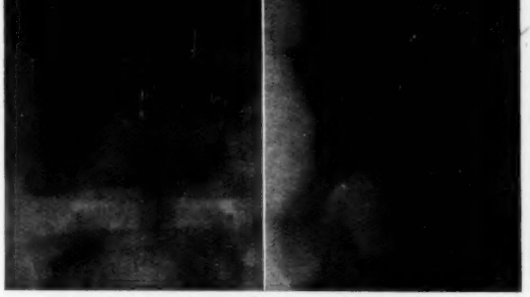
By D. W. Boatman, M.R.C.S.
FLYING OFFICER, R.A.F.V.R.; LATE HOUSE-SURGEON AT ST. BARTHOLOMEW'S HOSPITAL, LONDON

In the following case a piece of shrapnel lying intradurally in the spinal cord produced symptoms of meningitis after a latent period of three weeks. Hæmolytic streptococci were cultured from the cerebrospinal fluid, but with chemotherapy the patient made a complete recovery.

A Belgian soldier, aged 25, was admitted to an emergency hospital on May 21, 1940. Six days previously a shell had exploded near him and he had received two small shrapnel wounds, one in the lumbar region and one near the left scapula; both were now healing. He said that the blast effect of the shell had struck him on the right side of the pelvis, producing paralysis of his legs for three days. He had been seen at that time by a British medical officer who recorded no loss of sensation, but tenderness over the buttocks and the back of the thighs. The only positive physical sign on admission was some muscular weakness in the legs. A radiogram of the pelvis showed separation of the two pubic bones at the symphysis. A binder was applied, and the

patient remained comfortable for ten days, when he began to complain of general malaise. Three days later (June 3) he became very restless, complaining bitterly of pains everywhere and going into floods of tears. His temperature rose rapidly to 103° F. There was slight neck rigidity; no abnormality was discovered in the chest, abdomen or legs. The edges of the wound in the lumbar region were slightly inflamed. A radiogram revealed a foreign body situated in the spinal canal, opposite the upper limit of the first lumbar vertebra (see figure). On lumbar puncture the fluid was not under pressure but was slightly turbid, containing a moderate amount of pus and a small number of red cells. A gram film showed short-chain streptococci, and culture yielded hæmolytic streptococci.

Laminectomy was performed on June 4 under endotracheal gas, oxygen and ether anæsthesia. The laminæ of the last dorsal and first four lumbar vertebræ were removed, and the canal explored extradurally without success. The dura was then incised and the piece of shrapnel was felt lying against the posterior aspect of the cord in the position indicated by the radiograms. It was seized with a pair of forceps and removed without difficulty. It was found impossible to stitch the dura, so the posterior spinal muscles were carefully sutured in position. After returning to the ward the patient was laid flat on his back without pillows and with the foot of the bed raised. Chemotherapy was begun immediately, two intramuscular injections of Prontosil Rubrum 5 c.cm. being given in the first six hours, followed by 1 gramme of sulphanilamide three-hourly by mouth. Neck rigidity and Kernig's sign were present the next day, but he was moving his legs well. The temperature did not rise above 99·4° F.; the pulse-rate varied between 110 and 140. He was unable to micturate and catheterisation was necessary twice each day.



Anteroposterior and lateral radiograms showing foreign body lying in spinal canal at level of first lumbar vertebra.

On June 7 the abdomen was very distended and resonant all over, the bowels not having moved since operation. An enema, given the previous night, had been retained. Prostigmin 1 c.cm. was given hourly for six doses, followed by a turpentine enema, with a fair result. This was repeated the next day and all distension disappeared. The bowels were then kept open with calomel gr. 2 every night. The knee-jerks were absent and the plantar response was flexor on both sides. The stitches were removed on the 13th. The knee-jerks were now present, the left brisker than the right; the left plantar response was doubtful and the right absent. He began to pass urine involuntarily on the 14th and catheterisation was not subsequently required. Voluntary control was re-established a month after operation, but with increased frequency. By three weeks after operation (June 25) the neck rigidity had passed off and Kernig's sign was no longer present. The left knee-jerk was still brisker than the right, and there was a suggestion of a patellar clonus on the left side. The ankle-jerks could not be obtained and the plantars remained unchanged.

Sulphanilamide was continued until June 28, the dosage being: 1 g. three-hourly for 20 doses; 1 g. four-hourly for 20 doses; 0·5 g. four-hourly for 20 doses; 0·5 g. three times a day for 14 days; making a total of 75 g. The patient started to get up after a month. There was no change in the physical signs, save that the left plantar was now definitely extensor. Throughout the whole postoperative period his temperature never rose above 100° F.; but the pulse did not return to normal for six weeks. At that time the knee-jerks were brisk and equal and there was no patellar clonus; ankle-jerks were obtained on reinforcement; both plantar responses were now flexor. Sensation was normal and Romberg's sign was negative. Two months after operation he was walking well with the aid of a stick; but there was still some muscular weakness of the legs, more on the right side.

I wish to thank Mr. Reginald Vick for his suggestions and permission to publish this case.

Medical Societies

ROYAL ACADEMY OF MEDICINE IN IRELAND

AT a meeting of the Section of Obstetrics on Dec. 20, 1940, with Dr. R. M. CORBET the president, in the chair, Prof. O'DONEL T. D. BROWNE read a paper on the

Ætiology of the Lower Uterine Segment and Uterine Descent

He regarded the ligaments as the main factors in uterine support. Owing to the growth of the lower uterine segment in pregnancy the transverse cervical ligaments are spread upwards on each side, fanwise, as a lateral brace between the broad ligaments; thus they stabilise the uterus. The uterosacral ligaments decussate and are spread out over the posterior surface of the lower two-thirds of the uterus and, in addition to strengthening the new lower uterine segment, prevent undue falling forward of the heavy fundus. Thus these ligaments are taut even before labour and it would be easy for prolonged and strong uterine pains in difficult labour, or forcible instrumental or other delivery through an undilated cervix, to rupture the taut and widely separated ligamentous bands. He suggested that forcible downward traction tore the lowermost fibres, thus depriving the vaginal vault of its attachment to the under surface of the pelvic ligamentous support. The subsequent pull of the unsupported cervix upon the higher portion of the cervix which was still fixed by the intact ligaments resulted in supravaginal hypertrophy of the cervix. When coincident damage occurred to the upper and lower ligamentous supports uterine descent resulted. He defined high rectocele as a true hernia, at the bottom of the pouch of Douglas, between the two adjacent borders of the uterosacral ligaments. The cure of this relatively rare condition was by approximation of the uterosacral ligaments, either from above or per vaginam, and he emphasised that an extensive colpoperineorrhaphy—which served in low rectocele—would not suffice.

Prof. J. KAY JAMIESON said that the pelvic fascia was merely a sling for maintaining the genito-urinary organs in position. He said that there was no anatomical evidence whatever of the lower uterine segment, but there was no doubt that in a certain phase of life it did exist. Anatomists had no opportunity of seeing it at that time.—Prof. A. H. DAVIDSON mentioned three operations which gave the operator insight into the so-called cardinal ligaments of the uterus: vaginal hysterectomy, the Fothergill operation, and Wertheim's operation. Mackenrodt's ligaments varied according to the position of the uterus—whether it was pulled up or pulled down. In the Wertheim operation it was necessary to divide these ligaments as near to their insertion as possible. In treating uterine prolapse he preferred to do a Fothergill operation. The lower uterine segment arose from the isthmus of the uterus, and this was the portion of the non-pregnant uterus to which the cardinal ligaments were attached.—Dr. J. S. QUIN remarked that the anatomist and the gynæcologist held different views as to how the lower uterine segment was formed. He thought a high sliding rectoc le was always due to a hernia of congenital rather than traumatic origin.

Dr. BETHEL SOLOMONS said that the supports of the uterus were definite and even though Mackenrodt's ligaments were obviously the important supports every ligament helped, and a section of the pelvis showed thal the levator muscles and fascia were indirect supports through the vagina. He did not himself perform the typical Fothergill operation; he cut the utero-sacrat ligaments and sutured them to the front of the cervix.

After denuding the anterior surface he picked up the bladder pillars and brought them together in front of the bladder. These pillars he believed to be part of the pubo-coccygeus muscle. It was not necessary to suture Mackenrodt's ligaments in order to cure the prolapse: in fact there was danger of including the ureter in doing so. To cure a high rectocele he brought together tissue high up in the vagina which might or might not be the utero-sacral ligaments.—Prof. O'DONEL BROWN, replying, said that he had placed markers of bismuth and other materials in the lower uterine segment at known intervals during gynæcological operations, and had subsequently seen the radiograms of those markers throughout the pregnancy. He believed high rectocele to be a hernia occurring through the posterior vaginal fornix, from above, in contradistinction to low rectocele, commonly seen following skin tears incurred during delivery and taking place in the lower part of the vagina. He had encountered only two cases of high rectocele and had cured them by approximation of the inner borders of the utero-sacral ligaments. In his opinion, high rectocele could occur as a congenital deformity, and had been such in one of the two cases he had seen. He disagreed with approximation of the bladder pillars as a step in the treatment of prolapse. Anatomically, these so-called bladder pillars could not be demonstrated by dissection or at operation unless a fold was artificially created either by picking up the tissues with a dissecting forceps, by placing stitches so as to pucker the bladder wall, and thus produce something that appeared as a pillar of the bladder.

Amputation and Repair of the Cervix

Dr. EDWARD SOLOMONS reported on a series of 302 cases operated on between 1931 and 1939; only 104 came subsequently to hospital for examination. The operations performed were Emmet's trachelorrhaphy, Schroeder's partial amputation of the cervix and circular amputation of the cervix; included in the last were some Sturmdorf amputations. The suture material used nearly throughout the whole series was chromic or tanned catgut. Patients were later questioned concerning benefit from the operation, symptoms then present, the presence of discharge, the number of children since operation, the nature of the confinements, marital relationship since operation and whether any change in menstrual discomfort had occurred. A careful bimanual examination, followed by inspection of the cervix, was then made. If discharge was present it was investigated. He found that of the 104 subsequently examined 94 were benefited, backache being the commonest remaining symptom; 70 had no discharge after operation; 3 had a worse discharge after operation than before, discharge had improved in the remainder. Trachelorrhaphy gave the best results for fertility, 23 out of a possible 30 subsequently becoming pregnant. Healing was complete in 72, the result was bad in 1, and the remainder showed various degrees of slight ectropion or erosion. No cases of carcinoma of the cervix have been encountered after amputation or repair.

Dr. QUIN wanted to know what Dr. Solomons regarded as indications for operation in these cases. He believed that some cases of erosion would respond to being left alone or to treatment with mild caustics. Dr. A. W. SPAIN agreed that most erosions could be cured by cauterising the cervix two or three days after the menstrual period. He did not think that cancer of the cervix resulted from these conditions of the cervix. Prof. DAVIDSON said that unless the cervix was very much hypertrophied he preferred the electric cautery to operation. A fine anatomical cure followed the use of the cautery; and he thought that subsequent pregnancy and labour should be easier when cauterisation was adopted than when an operation was performed. In cases with small simple erosions the pH of the vagina was rather high. If the patients were treated by acid media for two or three months, or in some cases two or three weeks, it would be found that the erosion would completely disappear. Dr. BETHEL SOLOMONS said that in his experience cauterising methods were only suitable for the very early types of erosion. A carefully performed trachelorrhaphy or amputation cured nearly every case. Dr. E. SOLOMONS in reply said that of the 302 cases, 18 had been nulliparous, and of these 18, 4 were single women suffering from erosion of the cervix. In 60% to 70% of all the patients some other operation had been performed. The choice of treatment depended on the lesion present.

Reviews of Books

Essentials of General Anæsthesia

By R. R. MACINTOSH, D.M. Oxfd, F.R.C.S.E., D.A., Nuffield professor of anæsthetics in the University of Oxford; and FREDA B. PRATT, M.D. Lpool, D.A., first assistant in the department of anæsthetics in the university. Oxford: Blackwell Scientific Publications. Pp. 334. 25*s*.

THIS book is written for senior students, and for medical and dental practitioners who want to refresh their knowledge of general anæsthesia, but there is much in it which will also interest specialist anæsthetists. All forms and methods of general anæsthesia are described, but the main bias of the book is towards anæsthesia for dental surgery. The problems of dental anæsthesia are discussed fully and practically. Difficulties and dangers are dealt with frankly, and continual stress is laid on the necessity for coöperation between dentist and anæsthetist. The book is obviously the outcome of wide experience, and indicates a sympathetic knowledge of human frailties, both of patients and of anæsthetists. Drugs and methods used in dental anæsthesia are carefully described, and the chapter on Pentothal is particularly welcome. The authors emphasise that the effects of this drug vary with the speed of its injection.

The description (accompanied by excellent illustrations) of the difficulties of tracheal intubation comes as a welcome relief after the bland assumption, by some, that such difficulties do not exist. The chapters on physiology and the theories of anæsthesia, no doubt purposely over-simplified, are full of practical points. Methods of anæsthesia for major surgery might, perhaps, have been discussed more fully. As it is, such interesting and useful drugs as cyclopropane and Vinesthene, which have little place in dental surgery, have had to be passed over rather lightly, and only one apparatus has been described for the administration of nitrous oxide and oxygen in dental surgery; but, as the authors point out, the apparatus is less important than the man behind it.

Manson's Tropical Diseases

(11th ed.) By PHILIP H. MANSON-BAHR, M.D. Camb., F.R.C.P. London: Cassell and Co. Pp. 1080. 35*s*.

IN this edition, the fifth by Dr. Manson-Bahr, much historical and technical matter has been replaced by fifty pages of information on life in the tropics, on bodily and mental conditions that make for success in that life, and on measures that help towards this even before transfer to the tropics is made. The author's signal range of knowledge on tropical medicine is set out with discrimination, and he acknowledges his debt to constructive criticism. So might not the time-honoured figure of necator by Placencia be replaced by one showing the attitude which it takes up when killed as usual by hot spirit, and which permits immediate naked-eye identification? Again in the specific name *Wüchereria* there is divergence from the Code of Zoological Nomenclature which demands that names should be Latin or latinised, for Latin had no umlaut. As C. W. Stiles urged 40 years ago, medical men who have to enter the zoological field should keep the zoological rules. It is not strictly accurate to say that Clayton Lane devised floatation for the diagnosis of nematode eggs in fæces. An indirect-gravity floatation method was devised by Bass in 1909 and therefrom developed the direct-gravity floatation method of Willis and the direct centrifugal floatation of Lane. Further, the abolition of the stickiness of hook-worm eggs, which the floating solution produces, allows of their being herded into an area of a few square millimeters with consequent rapid diagnosis, the weight of the floating fluid used varying with the specific gravity of the egg species which it is desired to lift.

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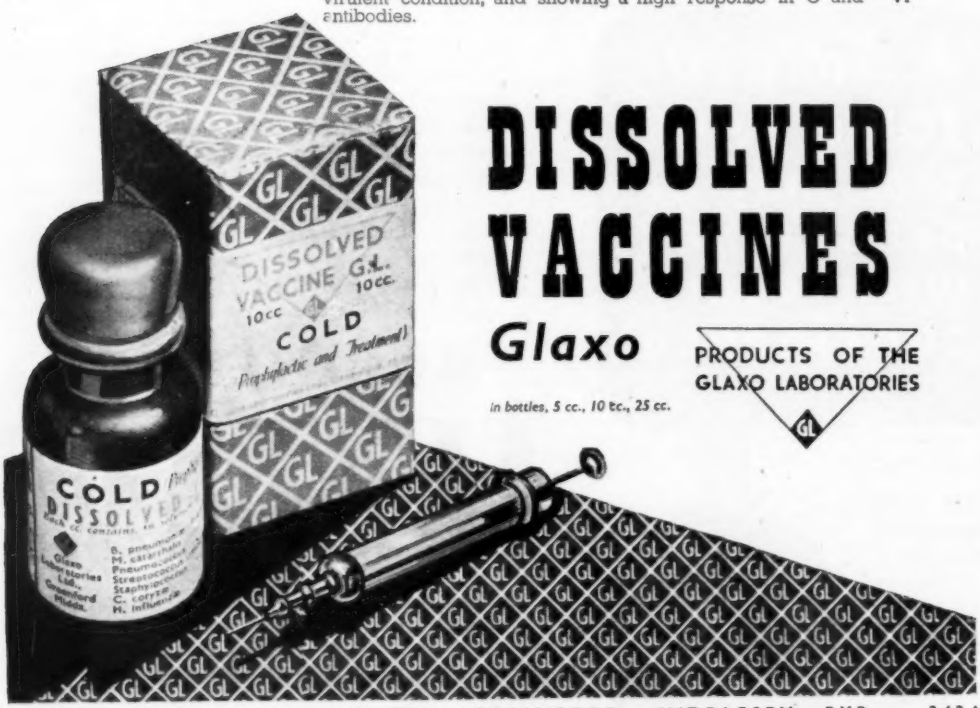

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LONDON: SATURDAY, JANUARY 18, 1941

WHAT WE OWE TO BERGSON

CERTAIN epochs stand out as marking a new departure in our attitude to the world or to ourselves. We long ago abandoned the geocentric conception of the universe; only a few of us can recall the intensity of controversy about that theory of evolution which placed man in genetic relationship to the rest of the animal world; many of us can agree that unconscious mental processes influence or direct what still feel like conscious desires or intentions; and we all know that relativity is a very important principle, even if we shrink from defining it. The names associated with these departures are familiar to everyone, but that of HENRI BERGSON—who has just died at an advanced age and has been acclaimed as one of the important philosophers of his day—is by comparison unknown. Yet, besides having its ethical values, his philosophical work deeply concerns our own attitude to sickness and sick people, for it sought to solve the question whether living things are actuated by some power or principle beyond chemistry or physics, a question that intrudes again and again into medicine, though every advance in the knowledge of things that can be weighed or measured has been hailed as an answer in the negative, from HALLER'S discovery of the irritability of nerve to the conditioned reflexes of PAVLOV. It was inevitable that the later part of the nineteenth century, with its wonderful advances in such knowledge, saw what appeared to be the final defeat of animism, but the mistakes of CHARCOT with his *grande hysterie*, of ERICHSEN with his railway spine, and of more recent clinicians with shell-shock, forced us back to a broader if older outlook. The discoveries of FREUD and the work of more academic psychologists opportunely provided an understanding of clinical phenomena about which the mechanistic view had led us astray, and the animistic approach was at last able to contribute to practical medicine.

It is against this historical background that BERGSON'S work must be considered. His *élan vital* is perhaps but a variant of the *phusis* of HIPPOCRATES or the *anima* of STAHL, or a forestalling of FREUD'S conception of *libido*, but his theory of creative evolution is the effort of a brilliant thinker, trained in modern science, to reconcile two differing modes of thought that, whether we know it or not, fundamentally influence our treatment of clinical matters. Some discussions in our columns are minor battles in the continued conflict between these irreconcilables, for we must admit that the genius of BERGSON has failed to find a convincing answer to the metaphysical problem that here confronts us. Maybe there is no such answer. Many of us however have, by force of temperament or early training, accepted without consideration or even question one or the other point of view, and it is this unquestioning acceptance that accounts for the warmth of feeling displayed when the point of view is challenged. For such acceptance, whatever the view accepted, a course of reading of BERGSON is the appropriate corrective.

CROSS-INFECTION OF WOUNDS

Two lessons which the war of 1914–18 taught us about wound infection were that gas gangrene could under certain conditions become a prevalent and fatal infection in the field, and that secondary sepsis was the chief contributor to the delayed healing and crippling complications of wounds in the base hospitals. In the present war gas gangrene has not raised its ugly head to any extent, but cross-infection of war-wounds in large hospital wards has again become a serious problem. Much of this secondary sepsis is due to the hæmolytic streptococcus and much of it is clinically latent, and we owe to bacteriological progress in the intervening years the opportunity to study today its sources and mode of spread with a precision that was impossible in the last war. The incrimination by J. SMITH of the streptococcal throat-carrier as the most common source of infection for the puerperal woman, the grouping of the hæmolytic streptococci by LANCEFIELD, the division into serological types of the human-pathogenic group-A streptococcus by GRIFFITH, and the utilisation of serological typing to trace the spread of infection in ear, nose and throat, scarlet fever and burn wards are some of the steps which have paved the way to a planned investigation of the causes of hospital wound infection. The Dunkirk evacuation and the steady stream since then of air-raid casualties enabled teams of bacteriologists and surgeons working at base hospitals in the London area to put such a plan into effect, and a joint report [1] now issued by three teams is full of informative data on the sources and channels of wound infection in hospital and of practical suggestions for its control.

The evidence of the occurrence of hospital infections comes from two main sources: (1) the demonstration of fresh pathogens in wounds examined bacteriologically at periodic intervals from the time of admission, and (2) circumstantial evidence pointing to the spread of readily identifiable pathogens—in particular typed strains of *Streptococcus pyogenes* which the authors call "indicator" organisms—among groups of wounded people. Of the first class of evidence may be mentioned a series of 20 wounds, 17 of which acquired new bacteria during a period of 3 to 27 days after the initial swabbing. *Staphylococcus aureus* and *Strep. pyogenes* were the most usual superadded pathogens, and in 7 of the 20 cases the super-infection was accompanied by clinical signs. In another series of 24 wounds treated by the closed-plaster method additions to the original flora were noted in 16 when swabs were examined at the time the plaster was being changed. *Strep. pyogenes* was the most frequent newcomer in this series; its usually persisted even when other organisms had disappeared, and it is important to note that in these plaster-treated cases its presence in the wound was often accompanied by clinical signs of infection. It is not stated—and probably could not be elicited—whether or not the superadded infection occurred when the plaster was being changed, but from other evidence it seems likely that bacteria were getting access to the wound with the plaster in situ. It was definitely proven that pathogenic bacteria can travel through the plaster from within outwards, for swabs from the outer

1. Miles, A. A., Schwabacher, H., Cunliffe, A. C., Ross, J. P., Spooner, E. T. C., Pilcher, R. S. and Wright, J. *Brit. med. J.* 1940, **2**, 855 and 895.

surface of the plasters yielded moderate or profuse growths of organisms, and in 4 instances the same type of *Strep. pyogenes* was found both inside and outside the casing. As regards the transfer of a particular indicator organism among groups of the wounded, numerous examples are given, mostly of the appearance in wounds already under bacteriological observation of a typed strain of *Strep. pyogenes* known to be present in the ward. In one such occurrence, in a ward accommodating both clean surgical cases and air-raid casualties, the infecting streptococcus attacked mainly, as might be expected, the open air-raid wounds, and as the infection spread symptomless throat-carriers of the offending streptococcus appeared among the staff, thus increasing the danger to any newcomer to the ward.

In their attempts to elucidate the sources and channels of spread of hospital infection, the investigators have incriminated among possible sources not only the upper air-passages of patients and nursing staff and the wounds themselves, but also the skin surrounding the wound for a distance of several inches, and the dressings, plasters and bedclothes containing dried infective discharges. Apart from bedmaking and change of dressings, pathogens were not apparently found in the air or dust of the wards by the method of plate exposure, but most of the work was done during the summer and autumn months when free ventilation would prevent heavy bacterial pollution of the air. The danger of using a hair-drier in an infected atmosphere to accelerate the tanning of burns is pointed out, as are the risk of infection being carried from wound to wound by fingers or forceps used in removing dressings and of sterile dressings carried round in a large bag or drum becoming infected, and the possibility of contracting infection from baths, bedpans and urinals that have not been sterilised.

The prevention of cross-infection in war-wounds is thus a matter which concerns every surgeon and every nurse engaged in the care of the wounded. In the dressing of wounds the ritual of the operating theatre should be observed, and dressings and plasters should preferably be changed in a side-room where the necessary precautions can be taken to prevent the accumulation of pathogenic bacteria in the air or dust. Gloves should be worn, for the hands of dressers cannot easily be freed of the pathogens derived from infected wounds.[2] Discarded dressings, including the apparently clean outer layers, and all infected linen should be placed with the minimum disturbance in receptacles containing 2% lysol, dressing-instruments and plaster-scissors should be sterilised between dressings by boiling for 2 minutes in 2% sodium carbonate, baths should be cleaned and disinfected with a mixture of cleansing powder and lysol, while bedpans and urinals should always be sterilised after use. The readiness with which the streptococcal throat-carrier can infect his own hands, clothing, bedclothes and furnishings around him has been demonstrated anew by Dr. HARE in our present issue, and universal and competent masking seems the only way to overcome this menace. There is still a certain reluctance to accept air-borne bacteria as a factor in hospital cross-infection, partly because of the apparent paucity of pathogens in the air of the ward, partly because bacteria in air or dust are regarded as less likely to be in an active vegetative state than those coming directly from the body-tissues. Yet it seems likely that a very few streptococci will be sufficient to initiate infection on an abraded surface, and there is increasing evidence that the air and dust of the ward are the vehicles for the spread of infection. New methods for the control of air-borne infection have lately been described by ANDREWES and his colleagues,[3] but, as they implied, the use of sprays and the like, must not be allowed to overshadow the value of adequate spacing and free window ventilation, with baffled screens during the blackout period, and the need for the removal of dust by soap and water and damp sweeping. Hospital infections could also be largely minimised by the adoption of small wards with isolation accommodation so that clean and septic cases could be separated, and the load of streptococcal infection in any one ward kept at a low level. The difficulties in the way of such reforms in our military and E.M.S. hospitals should not be insuperable. Antiseptics, apart from the local application of the sulphonamides, get little mention nowadays in any discussion on the prophylaxis and treatment of wound-infection, but their sphere of usefulness is not negligible, and the interested student will find a useful introduction to the subject by GARROD in the Lancet War Primer on Wound Infection.

DRIED PLASMA

PLASMA is available in large quantities at blood banks where the supernatant fluid is removed from over-age stored blood. This fluid has been widely used in the restoration of the blood-volume in shocked patients, and in the larger banks where the turnover is rapid it is still one of the best stock solutions. Its disadvantages are the excessive potassium content, which may be important when large volumes are given, and the precipitation, after about a fortnight's storage, of fibrin webs in what then becomes simply diluted serum. Serum has been said to be more liable to cause reactions than plasma, but it is probable, as BEST and SOLANDT[4] affirm, that there is no therapeutic or physiological difference between the two when used for transfusion. Until there is a complete check on the cleanliness of bottles, on the purity of distilled water and on the sterility of the final product reports of reactions peculiar to plasma or serum must be accepted with reserve. Samples of filtered fluid, scrupulously prepared and apparently sterile for a fortnight, may grow moulds in the third week of storage, and the making of serum from plasma usually involves additional manipulations which increase the risk of contamination.

Both serum and plasma are difficult to handle and transport compared with the dried products, which also require extremely careful preparation. Most of the numerous methods of desiccation depend on the removal of water either by simple distillation under reduced pressure or by sublimation from the frozen serum or plasma. All methods need skilled supervision and special apparatus, but EDWARDS, KAY and DAVIE[5] and lately HARPER, ESSEX and OSTERBERG[6] have described cheap and comparatively simple ways

2. Price, P. B. *J. infect. Dis.* 1938, **63**, 301.

3. Andrewes, C. H. and others, *Lancet*, 1940, **2**, 770.
4. Best, C. H. and Solandt, D. Y. *Brit. med. J.* 1940, **2**, 116.
5. Edwards, F. R., Kay, J. and Davie, T. B. *Ibid*, 1940, **1**, 377.
6. Harper, S. B., Essex, H. E. and Osterberg, A. E. *Proc. Mayo Clin.* 1940, **15**, 689.

of preparing these substances. It is probable that some workers who use temperatures much above 37° C. may denature the proteins in the drying process, but when drying is properly done there is no change in the individual proteins and the amounts of serum albumin and globulin remain the same after many months storage. The advantages of the dried products are stability, economy of space in storage and transport, and the opportunity they provide for using solutions of greater concentration than normal plasma. Their disadvantages are the difficulty of getting them into solution, especially with the higher concentrations of plasma, and the struggle necessary to preserve sterility in solutions under the emergency conditions where they are most likely to be used. Transfusions of 20 grammes of dried plasma dissolved in 500 c.cm. of 5% glucose in properly distilled water—a solution with roughly the same plasma-protein value as a pint of citrated blood—have been given with success. In normal concentrations solutions of the dried product seem to be as safe and effective as fresh plasma, and in moderate amounts, at least, they can be used without previous blood-grouping of the recipient.

With concentrated solutions of plasma and serum we are on less certain ground and their theoretical possibilities, particularly in burn-shock and nephrosis, have yet to be conclusively confirmed in practice. Of 3 burned patients treated by BLACK[7] with four-times concentrated serum 1 died while the other 2 needed subsequent transfusion with dilute fluid. BROWN and MOLLISON[8] gave mostly four-times concentrated serum to patients suffering from a variety of conditions and in 28 out of 44 transfusions there was, they believe, unequivocal evidence of clinical improvement. In 91 transfusions, however, they had 6 patients who vomited, 2 who developed urticaria and 3 who complained of lumbar pain, while 7 had febrile reactions. Concentrated serum or plasma is also highly viscous, often requiring to be given under pressure, and is capable of causing venous thrombosis. It is clear, therefore, that concentrated solutions should be used with discretion, and not everyone is convinced that it is good practice to introduce a viscous fluid into the blood-stream of a shocked patient whose circulation may already be seriously embarrassed by hæmoconcentration.

A FUND FOR NURSES IN DISTRESS

THE Royal College of Nursing has been asked to administer a fund which has been opened by the South African Trained Nurses Association for the relief of bombed civilian nurses in this country. The first instalment of £625 is now being allocated and will be used to meet immediate expenses such as the replacement of clothing, of those who have lost everything. Convalescents from injury and those who need rest and change after a period of strain can be put in touch with hostesses in quiet areas through the college's hospitality scheme, and the fund will then be used to meet their travelling expenses. Applicants for help must be nurses, registered or in training, who were in active work at the time of the bombardment. Applications should be addressed to the secretary of the college, 1a, Henrietta Place, London, W.1. There must be many who would wish to pay tribute to our nurses by contributing to this fund.

7. Black, D. A. K. *Brit. med. J.* 1940, **2**, 693.
8. Brown, H. A. and Mollison, P. L. *Ibid*, 1940, **2**, 821.

Annotations

RAYMOND PEARL

THE death of Prof. Raymond Pearl, at the age of 61, has come as a shock to his many English friends. Pearl was not a medical man, but during his tenure of the chair of biometry and vital statistics in the Johns Hopkins school of hygiene he was an inspiring teacher of post-graduate medical students and his influence, as teacher and investigator, has affected public-health work in all parts of the United States. As recently as 1937 he was Heath Clark lecturer at the London School of Hygiene and the volume which embodied his course is a characteristic example of attractive literary style and penetrating thought. Ten years earlier he had lectured before the University of London and the book then produced, "The Rate of Living," contained some of the researches which were probably his best. These were his experiments on populations of *Drosophila melanogaster*, a fruit fly. The disadvantage of working on an animal so remote from man—Pearl's darling study was the biology of *man*—was compensated by the small size and short life span of the creature and by the fact that genetic purity of the stocks could be secured. His book was one of the most suggestive of his time; it was the first to provide adequate data of mortality in relation to age and environmental conditions for an invertebrate and to make a point-to-point comparison with human mortality; in later papers he and his pupils published life tables for other forms of life (also for automobiles) and anyone who wishes to try out a "law" of mortality with age should begin with a study of Pearl's work. In recent years he was mainly engaged on the study of human population; a memoir on this subject appears in the last number of *Human Biology*, the journal he founded and edited. Pearl was not only an indefatigable worker and inspiring teacher, he was widely read in many branches of literature and a delightful companion.

CHARITY UNIVERSAL

IN 1939 the two great voluntary hospitals in Bristol—the Royal Infirmary and the General Hospital—which in the past had worked in more or less friendly competition, were amalgamated. The report of the Bristol Royal Hospital—"Charity Universal"—is thus of special interest this year. The fusion had been agreed to in 1937 and was part of a general incorporation of the public medical services, another item of which was the working arrangement between the public-health department and the university which was achieved several years ago. The final stage will be the fusion of all agents dispensing medical benefits, centred in the medical faculty of the university. Most cities possessing a university are working towards this, for of the various conflicting ideas for the future of medicine this is the only item which meets with general acceptance. So it goes ahead indifferent to the controversial proposition of a national medical service. To combine two charitable institutions is not easy and probably would never have come about had not the cost in apparatus and personnel for highly specialised treatment demanded either amalgamation with selection, or reduplication. Not only finance but medical science favours the former which allows the segregation of cases needing specialised treatment and research in units of convenient size. Bristol has arranged that general medical, surgical and fracture cases shall be dealt with at the infirmary; and gynæcological, skin, ear, nose and throat, and radiological cases at the hospital. There are efficient hospitals belonging to the corporation for maternity, infectious, chronic, and mental cases, so the city is well placed to give to all its citizens every form of treatment requiring institutional accommodation without overlapping or

competition. The financial difficulties of amalgamation of voluntary hospitals are considerable, for their resources vary greatly and unlike municipal hospitals they have no elastic source of revenue; so the pooling of incomes and expenditures usually calls for real statesmanship. In Bristol the total income of the two voluntary hospitals in 1939 was £98,802, the expenditure £143,680 and between them they have an accumulated debt of £193,000. The competition of the two hospitals in the past undoubtedly led to reduction of possible income and increase of sterile expenditure of both, for in Bristol there were a number of contributory schemes working to some extent against each other. The amalgamation committee decided to have one scheme of a uniform weekly contribution of 3*d.* weekly and appointed a committee to administer the "Bristol Hospitals Fund." It is expected that the new arrangement will make the Charity Universal self-supporting. It is doubtful if in present circumstances any reduction of debt is likely, but perhaps this is not of great consequence, for after the war a national solution of hospital debts must be found.

HEART DISEASE IN PREGNANCY

Sheehan and Sutherland [1] have supplemented Jensen's [2] and Bramwell's [3] clinical studies of heart disease in pregnancy with a thorough inquiry from the pathological aspect. They have analysed 813 necropsy records of patients who died during pregnancy or the puerperium in the Glasgow Royal Maternity and Women's Hospital during the last 23 years, and have found that 108 of these women had acute or chronic lesions of the heart. By way of control they have also studied a series of 1050 necropsies in general hospitals on non-pregnant women in the child-bearing period, 215 of whom had various types of valvular lesions of the heart. Like many pathologists they say that reports based on clinical findings are seldom completely confirmed at necropsy, and they found that less than two-thirds of cases of chronic valvular disease are recognised clinically. This indictment of the medical supervision of parturient women no doubt holds pretty generally in this country, and suggests that obstetricians do not apply their stethoscopes as assiduously to the chest as to the abdomen. Sheehan and Sutherland calculate that of the 235,000 obstetric patients treated by their hospital in the 23 years chronic valvular disease was present in 1·5%; the mortality in this group was 6·3%, 0·9% being due to superimposed ulcerative endocarditis, 2·9% to other cardiac causes, and 2·5% to non-cardiac complications. About half the patients with chronic valvular disease who died showed some evidence of congestive heart failure a fortnight or more before death. Decompensation commonly began at one of two periods—during the first few weeks of pregnancy, or about the sixth month. Such failure is most likely to occur with severe mitral stenosis or mitral stenosis associated with aortic stenosis. Deaths during or immediately after labour are usually due not to progressive exhaustion of a badly decompensated heart but to "acute heart failure," often in patients who have never shown more than slight signs of congestive failure. This analysis confirms the well-established observation that once a patient has shown signs of congestive failure during pregnancy any further pregnancy will be similarly complicated. It also brings out that the incidence of "simple recurrent endocarditis" superimposed on a chronic valvular lesion is much higher in pregnant than non-pregnant women, and much higher in women whose heart is decompensated than in those with no evidence of failure. Sheehan and Sutherland found that the diagnosis of this recurrent endocarditis is extremely difficult. They say that there is no satisfactory evidence that decompensation is related to myocarditis or acute pancarditis, and maintain that the type and severity of the valve lesions present are of great importance in deciding whether a patient's heart is likely to become decompensated. This teaching has been tending to gain ground of recent years, and is a reversal of the radical change of outlook introduced by Mackenzie when he urged the overruling importance of the myocardium. It is perhaps inevitable that the pathologist should be biased in favour of such a definite structural factor as stenosis or incompetence of a valve, but few clinicians who interpret their findings in terms of function rather than structure will be prepared to go back to the old teaching of the importance of valvular lesions. That, other things being equal, a button-hole stenosis of the mitral valve is more liable to produce myocardial failure than a slight degree of stenosis nobody will deny, but this does not explain why of two patients with comparable degrees of mitral stenosis one will die in the twenties and the other will live to sixty. Why a row of small vegetations on a chronically damaged valve, as in simple recurrent endocarditis, should be more likely to produce myocardial failure than an involvement of the myocardium the Glasgow workers do not explain. Perhaps they or some other will be inspired to carry out an equally careful investigation into this subject.

1. Sheehan, H. L. and Sutherland, A. M. *J. Obstet. Gynæc.* 1940, **47**, 597.
2. Jensen, J. The Heart in Pregnancy, St. Louis. 1938.
3. Bramwell, C. and Longson, E. A., Heart Disease and Pregnancy, Oxford. 1938.

PAIN IN THE SHOULDER

SUBACROMIAL bursitis is now generally recognised as the cause of most painful affections of the shoulder. This is due chiefly to improved X-ray technique and a greater understanding of the underlying pathology. R. L. Patterson and P. D. Wilson report [1] that, of 450 cases of painful shoulder seen at the Hospital for the Relief of the Ruptured and Crippled in New York between 1936 and 1940, 343 were diagnosed as bursitis; 163 were treated by irrigation. Bursitis due to bacterial infection is extremely rare and occurred in only one case of the 450. The common causes are calcification in the underlying musculo-tendinous cuff; arthritis of the acromio-clavicular joint and new bone formation on the under surface of the acrómion or the greater tuberosity of the humerus; and hæmorrhagic bursitis following contusion about the shoulder. The technique of irrigation is simple. Two points of the skin overlying the bursa are anæsthetised with Novocain and two 18-gauge needles inserted directly into the bursa, the one entering at a point two finger-breadths lateral to the coracoid process, the other one finger-breadth below the tip of the acromion. Novocain is injected and the direction of the needles altered until a flow is established. Normal saline is then injected. An attempt is made to strike any calcium deposit with the needle tip and the washings are inspected for calcium flakes. Irrigation is performed slowly since undue distension of the bursa causes considerable pain. After removal of the needles the patient usually makes no complaint of pain on passive abduction and external rotation of the arm. A sling is provided and use of the arm is not permitted for several days: sedatives are usually required for 24–48 hours. In cases of acute bursitis with pain of less than 10 days' duration and in which radiography has revealed a small, soft, diffuse calcified shadow in the region of the bursa relief follows treatment within 4–5 days. Acute pain due to hæmorrhagic bursitis is also relieved dramatically. Gradual relief over a period of 4–10 weeks occurs in a second group of cases of old-standing calcifying tendinitis where the patient's complaint is of increasing discomfort and slight limitation of complete abduction and where the radiogram shows a small, hard, smooth calcified deposit. In a third group of cases where the pain is due to tension in the bursa arising from neighbouring

1. *Post-grad. med. J.* December, 1940, p. 347.

arthritic changes, irrigation gives temporary relief. Radiography in such cases shows no gross evidence of calcifying tendinitis and the washings after irrigation contain a thick tenacious material like ganglionic fluid which by chemical analysis is found to contain calcium. Relief of bursal tension gives real relief for several months but re-irrigation is often necessary. Irrigation is contra-indicated in chronic periarthritis due to systemic infection of a joint, and in any case where infective arthritis or tuberculosis is suspected from X-ray examination. When a radiogram reveals a large calcareous deposit or several small deposits operative removal is required. Of the 163 cases treated by irrigation the results are available in 118. Of these, the result was satisfactory in 61%, and many of the failures were due to periarthritis in which experience now shows injection to be contra-indicated. If cases of periarthritis are excluded the good results reach 90%. Irrigation accordingly seems a hopeful method of treating subacromial bursitis but it is evident that cases must be carefully selected.

WAITING-LISTS

IT is not only in Lanarkshire [1] that there has been agitation for a fuller use of "reserved" beds in the treatment of civilian sick, but there especially has the public realised the hardship of closing beds to those suffering from disabilities not endangering life but necessarily undermining the well-being and functional efficiency of the sufferer. The chairman of Glasgow Royal Infirmary, as we noted last week (p. 53), has been driven to point out that his hospital has never found it necessary to refuse admission in any case where that was essential; he notes with misgiving a falling off in subscriptions not unrelated to disorganisation of normal hospital arrangements. In Edinburgh too, as our Scottish correspondent sets out, the financial position has become difficult. Costs have risen in every direction; at the Royal Infirmary the outlay per occupied bed was £231 as against £205 for 1938–39, while the cost per inpatient treated to a conclusion was £10 12*s*. as against £9 2*s*. Contributions from voluntary sources have tended to decline. Weekly contributions from work-people have again been a sheet anchor in the hospital's support, though it is stated that without the Government payment for reserved beds the deficit on the year's working (£5371) would have been much greater than that of the preceding year when it was some £39,000. Payments in respect of reserved beds represent a substantial contribution to the finances of voluntary hospitals in these days. At the close of the financial year there were in Edinburgh Royal Infirmary 844 occupied beds and 700 beds reserved for potential air-raid and Service casualties of which approximately 400 represented part of the normal bed complement and 300 extra beds were supplied by the Department of Health for Scotland. The hospital waiting-list has remained throughout the year at a figure just over 3000, the equivalent of full occupancy for some 160 beds throughout the year. It is difficult to believe that this number, substantial as it is, fully represents the actual number of patients that might normally have benefited from hospital treatment since even in peace-time with 400 additional beds in service there is a considerable waiting-list; unless, indeed, patients are being treated in other hospitals equally suited to their needs, which is improbable. It was to meet what is described as "a somewhat serious state of affairs" that the managers decided to make available 25 beds for the treatment of patients from the waiting-list who are suffering from such conditions as hernia, deranged knee-joints, hæmorrhoids and chronic appendicitis. Most of the voluntary hospitals are already dependent on state subsidy for reserved beds to meet their deficits. Pressure on beds for the treatment of gross disease is likely to increase and further beds are needed for the investigation of early disease, facilities for which are not yet readily available to the man who cannot afford to pay nursing-home fees. Here is a clamant field for medical planning and for real collaboration between the many interested parties.

1. See *Lancet*, 1940, **2**, 752.

TESTOSTERONE IN EUNUCHISM AND HYPOGONADISM

A. W. Spence [1] records the results of treatment of two cases of eunuchism and four of hypogonadism with intramuscular injections of testosterone propionate, implantation of tablets of testosterone, inunction of testosterone propionate, as an ointment or tincture, or the oral administration of methyl testosterone. In all cases the treatment was successful, as shown by the re-establishment of potency, increased growth of the genitalia, deepening of the voice, gain in weight, and, in five patients, increased growth of hair on the face, body and limbs. Physical improvement was also associated with the disappearance of psychological disturbances, and an accentuation of the mental characteristics of the male. The paper provides some valuable information on the dose required for the maintenance of this improvement. In the case of muscular injections, 50–75 mg. per week given in two or three injections were required. When the testosterone was administered by inunctions, these were given daily, with a weekly total of 32–49 mg. Administration of methyl testosterone by mouth necessitated a dose of 10 mg. five times a day. With implantation a 50 mg. tablet was used, and this was found to be effective for a period of eight to ten weeks. Judged on these results, it would seem that oral administration is the least effective method, and that there is little to choose between the others. In no case was there any evidence of toxicity, but one patient had a transitory œdema of the legs. A similar complication of testosterone treatment has been recorded by other observers, notably Kenyon, who described fullness and puffiness of the face in four eunuchoids under treatment. This was found to be associated with a fall in urinary sodium and chloride. The œdema, however, was transitory and need not be regarded as important. The first evidence of action of the hormone is a rapidly increasing frequency, degree and duration of erections, followed by a sense of well-being and renewed confidence. During the second or third month of treatment the increased growth of the penis begins to be manifest. A little later the patient becomes conscious of increased muscular strength, and in eunuchoid cases the voice breaks. The exactness of Spence's observations make them a valuable contribution to our knowledge of testosterone treatment.

EXOPHTHALMIC OPHTHALMOPLEGIA

SINCE Brain [2] drew attention to it, exophthalmic ophthalmoplegia has proved to be less uncommon than was thought. The recent publication of McGregor [3] and of Martin and Pennell in THE LANCET of Jan. 11 are evidence of the interest which is being taken in the syndrome. Its importance lies in the fact that it presents in a clear-cut form the problem of the pathogenesis of exophthalmos of endocrine origin, the solution of which is likely to throw light on the nature of the far commoner exophthalmic goitre. McGregor said that in his case the ophthalmoplegia was present for three months while the exophthalmos was slight and non-progressive, which he thought to be against the idea that the ophthalmoplegia was the result of a rapidly produced exophthalmos. Martin and Pennell believe that their case supports McGregor's view, though few perhaps would agree with them that exophthalmos amounting to 5 mm. should be described as slight. The point is an important one, and

1. *Quart. J. Med.* October, 1940, p. 309.
2. Brain, W. R. and Turnbull, H. M. *Quart. J. Med.* 1938, **7**, 293.
3. McGregor, H. G. *Lancet*, 1940, **2**, 579.

it is therefore worth recalling that Brain's explanation of the ophthalmoplegia was somewhat different from that attributed to him by these writers. He said: "There is reason to think that the ophthalmoplegia is due in the first instance to a rise of pressure within the cone of (extraocular) muscles and that the same rise of pressure causes the exophthalmos." It does not follow that the effect of this rise of pressure on the ocular muscles and on the position of the eye will always be proportional, nor that, as McGregor seems to imply, a rapidly produced exophthalmos is the same as a severe degree of exophthalmos. Whether the rise of tension will expend itself mainly antero-posteriorly, causing exophthalmos, or in a plane transverse to the optic nerve, causing interference with muscle function, or in both directions at the same time, may depend on the rate at which it occurs as well as on other unknown factors. Moreover, diplopia usually takes the patient to a doctor early, so that if both ophthalmoplegia and exophthalmos are due to the same cause cases will naturally be seen at a stage in which the exophthalmos is still slight. A measurement of the resistance offered by the eye to backward displacement might yield more information than the actual exophthalmos. It is doubtful if clinical information can throw much more light on the problem. It is to be hoped that the end of the war will see a resumption of the promising physiological research on the relations of the thyroid and the thyrotrophic hormone of the pituitary and the eye which its outbreak interrupted.

IS HEALTH CATCHING?

WE have all been warned repeatedly that it is possible to pick up things in the public shelter; but the Central Council for Health Education have ensured that some of the things to be picked up there are worth having. In collaboration with the Society of Medical Officers of Health they have prepared a booklet with happy illustrations, called "Health in the Shelter," which is issued to local authorities, on request, for distribution to the public. The crisp little appeals in it about such things as sleep, prevention of infection, dirt, and the transfer of children to the country are written with good sense, sympathy, wit and a practised touch. There are also four bulletins called "Coughing and Sneezing," "D–I–R–T Spells Disease," "Watch Out for Measles" and "Save Your Child from Diphtheria"; these are single leaflets which make their points simply and effectively. The diphtheria bulletin for example tells parents that diphtheria kills some 3000 children each year; but it also says in no less than four places and in heavy type that diphtheria can be prevented. The council are also providing posters and have a scheme brewing for films and lectures in the shelters. The writer of the booklet says: "And when the peace returns remember the health lessons that war has taught you." In fact the council gives the impression that the blitzkrieg, if not exactly heaven-sent, is a fine chance to spread the contagion of health.

VAGARIES OF THE PAUL-BUNNELL TEST

THE observation of J. R. Paul and W. W. Bunnell of Connecticut in 1932 that the blood of patients with glandular fever agglutinates the red cells of the sheep has been so often confirmed that a negative result from this test suggests some other diagnosis. On another page Fuller reports five cases in which the clinical picture was reasonably characteristic of the anginal type of glandular fever and mononucleosis was present but the Paul-Bunnell test did not confirm the diagnosis. Of the four patients tested two were completely negative. The other two gave a result below the diagnostic level of 1 in 80 suggested by the inventors of the test, and both of these had been given diphtheria antitoxin. Serum-sickness has been known to produce a positive Paul-Bunnell test, and Fuller is inclined to believe that diphtheria antitoxin was responsible for the agglutinations at low titres. He suggests that his cases may therefore have been suffering from an angina of the throat with mononucleosis due to a different agent from glandular fever. His cases are, however, clinically similar to a group also described in this issue by Stuart Barber, in which the test was invariably and convincingly positive. Of Barber's eight cases, seven were also of the anginal type; he emphasises the tonsillar involvement and the coincident infection with Vincent's organisms, both of which features were present in Fuller's patients. It seems possible, then, that these two groups had the same disease, but that in Fuller's cases something was interfering with the specific test. It is known that the sulphonamide drugs reduce the production of specific antibodies to pneumonia, and it is possible that they sometimes prevent the formation of heterophile antibodies to sheep's red cells. This might explain the negative result in two of Fuller's patients, and it is noteworthy that only one of Barber's series received chemotherapy. But this is mere speculation; clearly more information is required about the influence of both diphtheria antitoxin and the sulphonamides on the Paul-Bunnell test.

CARDIAC COMPLICATIONS IN DIPHTHERIA

CIRCULATORY failure remains one of the terrors of diphtheria. It usually begins the second week of the illness and its onset may be so insidious as to escape detection; but even so it may determine whether the patient lives or dies. Ma, Lieu and Tung [1] have studied the electrocardiographic changes in rabbits suffering from experimentally induced diphtheria and attempted to correlate these changes with those found in the myocardium at necropsy. There is little new in their electrocardiographic findings. These occurred with great regularity, consisting in the first place of flattening or inversion of T_1 or T_2, followed later by varying grades of auriculo-ventricular and bundle-branch block. In accordance with the findings in man, the prognosis attaching to high grades of auriculo-ventricular block and bundle-branch block was extremely grave, in their series being invariably followed by death. Their correlation of electrocardiographic and pathological findings is not very satisfying, probably on account of the absence of serial sections of the conducting system in the heart, but an interesting feature is their finding that in many instances the myocardial changes in fatal cases were less severe than in man. Two probable explanations for this are suggested: the shorter course of the disease in their animals; and the possibility of death being principally due to peripheral circulatory failure. Their pathological investigations were not complete enough to allow them to decide on the question of the precise amount of change in the heart, though their success in a few cases in promoting recovery by the intravenous administration of glucose suggests the importance of peripheral circulatory failure in this condition. These workers dismiss rather casually the rôle of the suprarenal glands in the circulatory failure of diphtheria. Ashford, Cramer and others [2] have shown that fatal circulatory failure occurring late is almost certainly due to paralysis of the peripheral vascular system, possibly due to damage to the suprarenal cortex.

1. Ma, W. S., Lieu, V. T. and Tung, C. L. *Chin. med. J.* 1940, suppl. 3, p. 574.
2. *Lancet*, 1939, **2**, 1375.

A combined reprint (price 2*s*.) of the two discussions held recently at the Royal Society of Medicine—one by the section of medicine on traumatic hæmothorax, the other by the section of surgery on chest injuries—is to be issued. Application for copies, of which only a limited number will be available, should be addressed to the society at 1, Wimpole Street, London, W.1.

Special Articles

HÆMOLYTIC STREPTOCOCCI IN NORMAL PEOPLE AND CARRIERS

BY RONALD HARE, M.D. Lond.

RESEARCH ASSOCIATE, CONNAUGHT LABORATORIES, UNIVERSITY OF TORONTO

IN previous papers (Hare 1940a, b) I suggested that the hæmolytic streptococci which cause infection of wounds in both civil and military life are of exogenous origin and are transferred to the wound some time after its infliction. Hæmolytic streptococci belonging to the group which is pathogenic for human beings—group A—are probably not present on projectiles and the great majority of objects which usually cause wounds, or on the substances which find their way into the wound at the time of infliction, such as dust, clothing or skin; on the other hand, group-A strains in the nasopharynx of attendants or in other hæmolytic streptococcal infections in the near neighbourhood often have access to the wound while it is being dressed. This paper records further investigations on the streptococcal flora of soil and dust and of the skin and clothing of the general population and known nasopharyngeal carriers.

Collection.—The area of skin or clothing to be tested was rubbed with a sterile throat-swab moistened with saline. Some cultures from the hands were obtained by rubbing them with sterile pieces of lint immersed in broth. The material was transferred to nutrient medium as soon as possible.

Cultivation.—The swabs were placed in infusion broth containing 1/500,000 gentian violet and 10% filtered horse serum. This medium was evolved by Garrod (1933) and is principally of value because it inhibits the growth of staphylococci. Control tests showed that hæmolytic streptococci of all the groups from A to K were able to grow readily in this medium. After incubation for 24 hours, or if no growth occurred for 48 hours, a loopful of the resulting culture was then plated on sheep's-blood agar plates. These were incubated anaerobically for 24 hours in a McIntosh and Fildes jar. Any hæmolytic colonies were then picked, plated and stored on blood-agar slopes. Anaerobic cultivation was employed for reasons discussed by Fuller and Maxted (1939).

Classification.—The serological group of all hæmolytic streptococci isolated was determined by the pipette method described by Lancefield and Hare (1935). The serological type of selected strains was also determined if possible. The slide method of agglutination was employed. The suspensions were made by growth at room temperature in 0·1% glucose broth. The centrifuged deposit was actually employed in the tests.

THE SKIN AND CLOTHING

The flora of the skin of the hands, peri-anal region and back has been previously studied by Colebrook and his colleagues (1935). They examined the peri-anal region in 160 parturient women in the antenatal department and the findings may perhaps be taken as representative of the population as a whole. Of the 11 strains of hæmolytic streptococci isolated none were of group A. The number of subjects (14) whose backs were examined was too small for general conclusions to be drawn, but no group-A strains were isolated. The subjects whose hands were studied were, for the most part, girls working as packers in two factories. From the 181 persons 17 strains were isolated, of which no less than 7 were members of group A. In the present investigation, the hands and the legs of 96 male students, for the most part studying pharmacy or the preclinical subjects of medicine, were examined, as well as a number of other persons. The hands were chosen for obvious reasons, the legs because the skin has often been suspected as the source of the organisms in infected wounds of the knee-joint or compound fractures of bones of the leg, in both of which lesions hæmolytic streptococcal infection is comparatively common. The first series of hands was examined in November and December, 1939. From the 96 male students 9 strains of hæmolytic streptococci were isolated and another 3 strains from 52 more persons (fifth-year medical students, female students and others). As will be seen from table I, none of the strains were of group A.

In view of the work of Colebrook and his associates this result was unexpected. But there was some possibility that the organisms in 5 out of the 7 persons with group A on the hands in their series had been derived from the nasopharynx because it was subsequently ascertained that the subjects were suffering from "colds" at the time the hands were examined. Those investigations were carried out in England during the four months, November–February, the latter part of which period tends to have a high nasopharyngeal-carrier rate (Paine 1935, Ministry of Health report, 1930). The first Toronto series was examined in November and December, but this time of the year in North America usually has a low carrier rate (Bourn and his colleagues 1933, Meleney 1927). Of 160 soldiers examined in Toronto during this time not one nasopharyngeal carrier of group A was found. For this reason a second series of hands, this time of 100 pharmacy students, was examined on March 27 when the carrier rates in North America tend to be higher, and when upper respiratory tract infections associated with hæmolytic streptococci were actually occurring in Toronto. In this series only 3 strains of hæmolytic streptococci were isolated but one of them was a member of group A.

It is probable that the man from whom this strain was derived (SNO) had acquired his organisms from the nasopharynx of his room-mate (ROL), who on the same day was sick in bed with a hæmolytic streptococcal infection of the throat. This conclusion is rendered the more probable by reason of the fact that the organisms from both ROL's throat and SNO'S hands were found to be type 4; that SNO was re-examined on April 26 and found to have no hæmolytic streptococci anywhere on his skin, clothes or nasopharynx; and that he had had no upper respiratory tract infection for over a year. It therefore seems probable that he had been a temporary hand carrier on the day he was first examined by reason of his close contact with an acute infection.

It thus appears that hæmolytic streptococci of group A are somewhat more unusual on the skin of the hands of the population in general than might have been supposed from the work of Colebrook and his colleagues. The only person with these organisms on his hands in the present investigation of 248 persons had almost certainly picked them up by contact with an active infection; and this conclusion is strengthened by the discovery, reported later, of hæmolytic streptococci of group A on the hands of 2 out of 7 known nasopharyngeal carriers. It seems probable that the hands tend to be free from these organisms unless there has been contact with some nearby source, such as the individual's own throat or an infection in another person.

Cultures from the legs of the 96 students whose hands were examined in November and December were also taken; 7 strains of hæmolytic streptococci were isolated but none of them were members of group A (table I).

Levaditi and Delrez (1917) suggested that lack of opportunity to bathe might bring about an increase in the number of streptococci on the skin, and thus be in part responsible for the high incidence of streptococcal infection of wounds. It was found that of 16 persons who had no hæmolytic streptococci on the skin of the leg no less than 4 acquired these organisms (3 group C, 1 group B) on an area of skin purposely left unbathed; 3 of them acquired the organisms during the first week and the fourth after two weeks. No group-A strains were encountered. Thus lack of opportunity to bathe may bring about an increase of the streptococcal flora of the skin but not necessarily of group-A strains.

Samples were also taken from the clothes of the 96 students whose skin was examined in November and December. The area examined was the cloth of the trousers below the knee. Five strains were isolated and from table I it will be seen that none of them were members of group A. Another series of 25 persons, chiefly laboratory technicians, was also examined and no hæmolytic streptococci at all were isolated. Thus from the trousers of a total of 121 persons no hæmolytic streptococci of group A were isolated.

It is thus clear that hæmolytic streptococci of group A are not usually present on the skin of the general population. As already mentioned, Colebrook and his

colleagues failed to isolate them from the peri-anal region and in the present study they were not found on the legs. One person out of 248 was found with these organisms on the hands, whereas Colebrook isolated them from 7 out of 181. Thus, of the areas examined only the skin of the hands is at all likely to be contaminated with these organisms. If the trousers can be taken as representative of the clothing it appears that the clothing of the general population is likewise not often contaminated.

KNOWN NASOPHARYNGEAL CARRIERS

A group of 7 carriers were studied. The detail's of KEE, ROL, MOS, TOW and RIC are given later. ROS suffered from acute tonsillitis beginning on Dec. 19 and group-A hæmolytic streptococci were isolated from the throat on Dec. 19, Jan. 2 and 30 and on March 5 and 7. WAT suffered from a simple cold on March 26 and 27; there was no cough, pyrexia or complications; group-A hæmolytic streptococci were isolated on March 30 and April 22.

A number of different areas on both skin and clothing were examined and the results are given together in table II. From this it is obvious that carriers may seriously infect their own persons but that only a proportion of them are able to do so. Of the areas examined there was a distinct tendency for the hair, the skin of the face and hands, the clothing of the trunk and the handkerchief pocket to be contaminated. These are, in general, areas which are accessible to the nasopharyngeal secretion. Thus the skin around the mouth was contaminated at one or other examination in 5 out of the 7 carriers examined, whereas that of the legs and the hands was contaminated in only 2. Contamination of the skin and clothing is therefore much more likely to occur in carriers than in the general population.

The organisms were found in the nose as well as in the throat of 3 of the carriers and in these the contamination of the person was more widespread and persisted longer than in the remainder who had the organisms in the throat only. The length of time any particular area remains infected varies considerably but the organisms seem to disappear from the skin and the clothing before the carrier condition clears up. Nevertheless, there is evidence in the case of the carrier KEE that the organisms could be cultivated from the face and the hands over a period of 24 days, and from the coat and pocket over 37 days; while from the carrier RIC they were cultivable over 55 days from the corner of the mouth and the hands.

In view of the demonstration by Colebrook and Maxted (1933) of the bactericidal power of the human skin for these organisms it is probable that unless constantly renewed by deposition from other sources, such as the nasopharynx, they are not likely to persist on the skin for long. Experiments have also been carried out on the survival of group-A hæmolytic streptococci on clothing.

TABLE I—HÆMOLYTIC STREPTOCOCCI ON THE SKIN AND CLOTHING

Site	Season	Persons tested	Occupation	Positive	Group of hæmolytic streptococci									
					A	B	C	D	E	F	G	H	K	?
Hands	Nov.–Dec.	96	Male pharm. and preclin. med. students	9	0	1	7	0	0	0	0	0	0	1
	Nov.–Dec.	52	Male and female students in clin. years	3	0	0	2	0	0	0	1	0	0	0
	March	100	Pharmacy students	3	1	1	0	0	0	0	1	0	0	0
Legs	Nov.–Dec.	96	Male pharm. and preclin. med. students	7	0	2	3	0	0	0	2	0	0	0
Trousers	Nov.	96	Ditto	5	0	1	2	0	0	0	2	0	0	0
		25	Male technicians	0	..	..	..	..	..	..	..	..	..	..

TABLE II—HÆMOLYTIC STREPTOCOCCI ON THE PERSON OF NASOPHARYNGEAL CARRIERS.

Name	Date	Throat	Nose	Saliva	Hair	Upper lip	Corners of mouth	Lower lip	Tie	Front of shirt	Front lapel of coat	Chest	Back of shirt	Back of coat	Back	Hands	Handkerchief	Handkerchief pocket	Legs	Trousers
RIC	June 6	A	A	–	A	A	A	A	–	A	A	..	–	–	..	A	A	A	–	–
	28	A	–	–	–	–	A	–	A	..	–	A	–	–	–	A	A	A	A	A
	July 30	A	A	–	–	–	A	–	–	–	–	–	–	–	–	–	A	–	–	–
KEE	Mar. 12	A	A	–	..	A	A	A	..	..	A	..	..	A	..	A	A	A	–	–
	14	A	A	–	..	A	A	A	..	..	A	..	..	A	..	AB	..	..	–	–
	April 5	A	A	–	–	A	A	A	..	..	A	..	..	–	..	A	A	A	–	–
	18	A	A	A	–	–	–	–	..	..	A	..	..	B	..	–	A	A	–	–
	May 15	A	–	–	–	–	–	–	..	..	–	..	..	–	..	–	–	–	–	–
ROL	Mar. 28	A	A	A	A	–	–	–	..	..	–	..	..	B	..	–	•	A	–	–
	April 16	A	A	–	A	A	A	A	..	A	–	..	..	–	..	–	•	A	–	–
	25	A	A	A	–	B	–	–	–	..	–	–	..	–	..	–	•	–	–	–
WAT	Mar. 30	A	–	A	–	–	–	–	–	..	–	..	..	–	..	–	–	–	–	–
	April 22	A	–	–	–	–	–	–	–	..	–	..	..	–	..	–	–	–	–	–
MOS	June 18	A	–	A	–	–	A	–	–	–	–	–	–	–	–	–	–	–	–	–
	July 3	A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TOW	June 11	A	–	A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	14	A	–	–	–	A	–	–	A	–	–	..	–	–	..	–	A	–	A	–
ROS	Mar. 7	A	–	A	..	–	–	–	–	..	–	..	..	–	..	–	–	–	–	–

• Did not carry a handkerchief. – means examination made but no hæmolytic streptococci isolated. .. means no examination of that area made.

As might have been expected, temperature has a considerable effect on the time of survival, but at room temperature (60–70° F.) there was evidence of the ability of group-A strains to survive for 30–40 days, when 0·5 c.cm. of a 1/10,000 dilution of a serum-broth culture was dropped on pieces of cloth. Thus, unlike skin, clothing once infected may remain so for comparatively long periods.

There is thus evidence that the skin and the clothing of nasopharyngeal carriers may be contaminated by hæmolytic streptococci. This contamination is not invariable, and appears to occur oftener and be more widespread in nasal carriers than in those who have the organisms only in the throat. The length of time any particular area remains contaminated in such a person is probably very variable but may be considerably over a month.

ROAD-DUST AND SOIL

No previous studies on the hæmolytic streptococcal content of dust and soil appear to have been made. Difficulty was encountered from the presence of organisms with very wide areas of hæmolysis which obscured the much smaller hæmolytic areas of the streptococci. Direct plating of the soil on blood-agar plates, or after its preliminary cultivation in serum-broth, was therefore useless, anaerobic cultivation only increased the difficulties. Unsuccessful attempts were made to suppress these strongly hæmolytic organisms by preliminary growth in gentian-violet-serum broth or in undiluted fresh normal human serum. The following method was finally adopted.

The soil or dust, after being dried over calcium chloride in a desiccator for 24 hours, was finely powdered by rubbing through sterile surgical gauze or a 100-mesh wire screen; then—because it is almost impossible to spread small amounts of such material evenly over the surface of a blood-agar plate—the powder was mixed with dry sterile sand in the proportion of 0·1 g. to 0·9 g. of sand, further dilutions being made as desired. Dilutions of 1 in 100 and 1 in 1000 were found to be satisfactory; by spreading 0·1 g. of one or other of them over the surface of a blood-agar plate it was possible to separate the strongly hæmolytic organisms. Control tests in which as few as 200 hæmolytic streptococci were added to 0·1 g. of soil, which was then diluted in the manner described, showed that it was possible to isolate the organisms. The method will not detect minor degrees of contamination but it detects the more severe degrees.

A total of 50 specimens were examined in this way, most of them from paths and roadways along which pedestrians and vehicles were constantly passing, but a number of specimens of garden soil were also included. All the specimens were taken from areas which might have been accessible to human contamination, and most of them were examined in May and June. The weather was showery but the specimens were always taken on dry days. None of them contained hæmolytic streptococci, although alpha hæmolytic strains were present in some.

DUST OF INFECTED ROOMS

No examinations of the dust of houses in general have been made but fairly complete studies have been carried out on the presence of hæmolytic streptococci in rooms inhabited by carriers. The rooms of 5 carriers were examined, samples being taken from the bedclothes, the walls, the curtains, bedside tables, and the carpet. In each instance the carrier had suffered from the acute phase of his illness in the room in question, and had continued to sleep in it during the succeeding period while he was under investigation. The same difficulties were encountered in these examinations as in the study of soil and dust referred to above. In face of this, the isolation of hæmolytic streptococci is of more significance than their apparent absence.

The cultures were actually obtained by rubbing a moistened throat swab over the area selected, inoculating a blood-agar plate direct and then transferring the swab to 1/500,000 gentian-violet broth containing 10% horse serum. The broth was incubated for 24 hours when explants were made on blood-agar plates, one set of which was incubated aerobically and the other anaerobically. One or other of these plates might have colonies of hæmolytic streptococci, which were then isolated and identified as above.

The following results were obtained with five carriers.

RIC had an infection of the index finger (paronychia) which began on June 1 and was opened on June 2. Hæmolytic streptococci were isolated from the pus on June 6. The infection cleared up rapidly. On June 3 he developed tonsillitis. He stayed in bed on June 4 and returned to work on June 6, when group-A strains were isolated from nose and throat and other areas as given in table II; the strains from the throat and the hands were type 11. His room was examined on June 7 when hæmolytic streptococci were found on top and bottom sheets, pillow, pyjamas, and carpet, all strains being members of type 11; they were not found on the wall near his bed, the curtains, or the bedside table. He continued to carry the organisms and the room was re-examined on July 29, when hæmolytic streptococci were only found on the bottom sheet and his pyjamas; the strains were type 11. On July 1 he went on holiday, and while away a paronychia of the thumb developed which discharged spontaneously; hæmolytic streptococci of type 11 were isolated from the pus. He returned to a new room on July 21 and this was examined on July 30. No hæmolytic streptococci were isolated although he was still carrying the organisms in nose and throat. The results obtained from his skin and clothing on June 6 and 29, and on July 29 are given in table II.

ROL shared a room with a fellow student, SNO, in the same house as the carrier KEE. He suffered from an acute nasopharyngeal infection on March 26, from which hæmolytic streptococci of type 4 were isolated. There was sore throat and relatively mild prostration; no fever, chills or rash. He spent March 26 only at home and was well enough to attend lectures on March 27. On March 26, SNO was found to have type 4 hæmolytic streptococci on the hands. On April 24, the landlady, NAU, went down with laryngitis from which type 4 was also isolated. ROL was found to be a nose and throat carrier when examined on March 28, April 16 and 25. A swab sent by post on June 6 was negative. On May 3 the room was examined immediately after both occupants had left for holiday. No hæmolytic streptococci were found on the bed, the walls, the curtains or the desks, but they were present in two places on the carpet; they were also of type 4. The room was re-papered and painted and examined again on June 10 when no hæmolytic streptococci were found.

KEE suffered from a sore throat on Dec. 24. This was diagnosed at the time as a cold. He was first known to be a carrier on March 12 when type 4 hæmolytic streptococci were isolated. He continued to be a nose and throat carrier until April 16. On May 15 he carried the organisms in the throat only and on June 10, on return from his holiday, was found to be free from them. His room was examined on May 3 when no hæmolytic streptococci were isolated.

TOW suffered from a fairly typical attack of tonsillitis on June 5, type 1 hæmolytic streptococci being isolated. The organisms were present in the throat but not in the nose on June 11 and 14. He left for his holiday on June 15 and no further specimens were available. The room was examined on June 7 while he was still in bed but no hæmolytic streptococci were isolated.

MOS began an ordinary cold on June 13 and he was confined to his bedroom until June 16. There was cough with nasal discharge. Hæmolytic streptococci were isolated from the throat but not the nose on June 18, July 3 and August 21. The room was examined on June 19 but no hæmolytic streptococci were isolated. He then left for a holiday and the room was vacated permanently.

Evidence that the bedclothes and the rooms were contaminated was thus obtained in only two cases, RIC and ROL. In RIC this result was somewhat vitiated by the infection of the finger which preceded that of the throat, although this was almost healed at the time the room was first examined and quite healed at the time of the second examination 22 days later. There is, however, no doubt that there was widespread contamination of the room, whether the organisms were derived from the throat or the finger. This contamination was most severe on the bedclothes, but the carpet was also contaminated. His new room, taken after his return from his holiday, was not contaminated when examined after 9 days of occupation, despite his being still both a nose and throat carrier. In ROL there was no complicating open sepsis, although he had also spent the acute phase of his illness in the room which was examined. The only area from which the organisms were isolated was the carpet but it is possible that other parts of the room were also infected, because the organisms were found on several areas of his skin and clothing as well as the hands of his room-mate, SNO.

Thus there is evidence that a mild atypical infection, such as that of ROL, may cause contamination of the room. These findings amplify those of Cruickshank (1934), White (1935) and Brown and Allison (1937), showing that the dust of wards in which infected burns, puerperal infections, and scarlet fever cases are being nursed may be similarly contaminated.

DISCUSSION

The investigations here reported show that the substances (skin, clothing, dust and dirt) which usually find their way into wounds in normal persons at the time of infliction are probably not the source of any hæmolytic streptococci of group A which may subsequently be found in the wounds. It is therefore probable that these organisms are derived from outside sources, such as the nasopharynx of carriers or septic infections in the neighbourhood. On the other hand, the skin and clothing of persons who carry these organisms in the nasopharynx may be widely, heavily and persistently contaminated; so that a wound in such a carrier may possibly be infected at the time of infliction by hæmolytic streptococci of group A already present on his skin or clothing. What proportion of wounds are infected in this way and what from exogenous sources is not known, but investigations are in progress which may provide an answer.

These studies also show that carriers constitute a grave danger to other persons in ways which might not have been foreseen; not only do they expel hæmolytic streptococci when speaking or coughing (Hare 1940) but their hands may be contaminated. Masks alone are not a safeguard, because such persons may still cause infections by contact if they handle raw tissue without wearing gloves. It has also been shown in this paper that they are able to contaminate the bedclothes or the floor of their room. This shows that if their bedding or the floor of their rooms is disturbed in any way, dried secretion may be liberated into the atmosphere with the possibility of transmission of the infection to the nasopharynx or open wounds of other persons in the neighbourhood; and for reasons given elsewhere (Hare 1940c) it seems probable that in the dissemination of nasopharyngeal infections this indirect route is more usual than direct transmission by droplets or droplet nuclei.

SUMMARY

Hæmolytic streptococci of group A are rare on the skin and clothing of normal persons.

There may be widespread contamination of the skin and clothing of nasopharyngeal carriers.

Hæmolytic streptococci are not present in the dust and dirt of city or countryside.

Hæmolytic streptococci of group A may be present in the bedclothes and in rooms in which carriers are sleeping.

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MEDICINE AND THE LAW

Damages for Lost Expectation of Life

THERE are rumours in the legal world that the highest authorities are contemplating the preparation of a bill to abolish the award of damages for loss of expectation of life. Lawyers have often been heard to express their dissatisfaction with this perplexing new element in litigation. A death occurs after an accident due to somebody's negligence—usually the negligence of a motorist. If it be established that the life was shortened by the accident, some figure representing the loss suffered by the deceased through the shortening of the life may be included in the damages. The judges have repeatedly asked for guidance in the assessment of that figure. Some of them have told a jury that it is being asked to achieve the impossible, since only Providence can tell how long the life would otherwise have lasted. Lord Justice McKinnon has declared the problem to be insoluble. The guess of the Court of Appeal is no more likely to be right than the guess of the trial court. If the victim be a child, ought the award to be higher than in the case of an adult? Ought social position or prosperous financial prospects to affect the figure?

The doubts found their way up to the House of Lords last month in the case of Benham *v.* Gambling. Mr. Justice Asquith had awarded £1200 for an infant of 2½ years at Winchester assizes. In the court of appeal two lords justices (Slesser and McKinnon) agreed with the amount, but Lord Justice Goddard thought the proper sum should be £350. The House of Lords unanimously holds that £200 is quite enough. Thus there is a downward trend. Lord Chancellor Simon says that the ups and downs of life, its pains and sorrows as well as its joys and pleasures, must be regarded. The very young child's loss of expectancy is not to be assessed so high as that of someone who has passed through the uncertainties of infancy and has reached an established position with reasonably firm hopes of the future. The prospects of worldly possessions must be disregarded; law, like philosophy, must pronounce that happiness does not depend on wealth or status. The damages are for loss of life, not for loss of pecuniary prospects. But the puzzle still remains though the range is reduced. It is wrong, says Lord Simon, to apply any statistical or actuarial test; it is idle to pursue arithmetical calculations—if one knew the exact number of lost years, it would still be difficult to put a value upon them. The court has to be satisfied that the circumstances of the particular life were likely to lead, on balance, to a positive measure of happiness, of which the victim has been deprived by the defendant's negligence. If the victim's character or habits suggested a future of unhappiness or despondency, a smaller award might be justified. At once one thinks of the possible effect of a world war upon popular estimates of future happiness. Such are the metaphysical speculations which judge and jury must undertake.

The legal remedy of damages for diminished expectancy of living had already been formulated before the passing of the Law Reform (Miscellaneous Provisions) Act of 1934. That statute changed the law by allowing rights of action, which formerly were terminated by death, to survive for the benefit of the victim's estate. That is why in cases like Benham *v.* Gambling the father is found suing as administrator of the estate of his infant son. Previously, in the language of the Latin maxim, a personal action died with the person, so that it was cheaper for the motorist to kill his pedestrian than merely to disable him. The 1934 act was passed upon the recommendation of the Law Revision Committee. Some say that these experts foresaw the litigation over lost expectancy, others say they did not. However that may be, the operation of this litigation seems to be obstructed by so much uncertainty—there being no simple tariff with weight for age or otherwise—that its abolition might be welcome.

SCOTLAND

HONYMAN GILLESPIE LECTURES

AN attractive programme of lectures has been arranged by the Honyman Gillespie Trust for the present term to be held in the west medical theatre of the Edinburgh Royal Infirmary at 4.30 P.M. on six successive Thursdays beginning Jan. 30. Lieut.-Colonel T. Douglas Inch will open the series with his experiences of the past year in the R.A.M.C.; Prof. R. J. S. McDowall will speak on the physiological approach to medical problems; Dr. C. P. Stewart on the nutritional factors concerned in dark adaptation; Prof. J. A. Gunn on the action of drugs on the human uterus; and Prof. J. Chassar Moir on the detection of pelvic contractions. Mr. W. A. Cochrane will conclude with Orthopædics: a brief survey of its position. The lectures are open to practitioners.

EDINBURGH ROYAL INFIRMARY

In their annual report the managers give figures for the year's working which refute current gossip that the hospital is not busily engaged with civilian illness because of the reservation of beds for air-raid casualties. During last year 18,182 patients were admitted compared with 21,341 in the previous year; of these 8858 lived in the city and 9324 beyond its boundaries. Patients came from practically every county in Scotland, including Orkney and Shetland, and from 29 counties in England and Wales; 10 resided outside Great Britain. At the various outpatient departments 65,794 new patients attended, 7705 fewer than in the previous year; the total attendances work out at just under 1000 a day including Sundays. The managers have under consideration a scheme to run these departments primarily as consultative centres and for the treatment of emergencies. The number of motoring casualties showed a reduction on 1939, inpatients being 319 as against 395, outpatients 484 as against 633. These patients spent an aggregate of 6199 days in hospital, costing £2970 to maintain, while only £1336 was received from insurance companies in respect of claims under the Road Traffic Acts. The reconstructed and re-equipped radiological department has been working to capacity throughout the year both in the diagnostic and the treatment sections despite war reductions in the staff. Considerable economy has been effected in the consumption of film. The bulk of the radium, both that owned by the infirmary and on loan from the National Radium Commission, has been buried in accordance with the scheme decided upon at the beginning of the war, sufficient being kept above ground for emergency use. A deficit of over £13,500 on the year's working of the Simpson Memorial maternity pavilion has given concern to the managers who have been trying, so far without much success, to induce local authorities to increase their contributions.

THE NEW CHIEF M.O.H. FOR SCOTLAND

In succession to Dr. J. M. Mackintosh, who was recently appointed to the chair of public health in Glasgow University, the Secretary of State for Scotland has appointed Dr. Andrew Davidson as chief medical officer of the Department of Health. Dr. Davidson is at present medical officer of health and school medical officer for the North Riding of Yorkshire. He is a Glasgow graduate, and after working in the department of physiology there and serving in the R.A.M.C. in the last war, he joined the Glasgow public health department in 1922, passing through junior posts to become medical officer in charge of the central division of the city. Later he was deputy C.M.O. for Surrey. It is understood that, as Professor Mackintosh's appointment will not take effect for some time, Dr. Davidson will not assume his new duties immediately.

In England Now

A Running Commentary by Peripatetic Correspondents

THE other day I happened to see on a railway bookstall a small volume entitled The Disappearance of Jerry. "At last," said I to myself, "someone has had the courage to write a treatise on this important subject"—and straightway bought a copy. I was disappointed, however, to find when I settled down to read it in the train that it did not deal as I had expected with the causes and consequences of the vanishing chamber-pot but was just another thriller. That the chamber-pot is fast disappearing there can be little doubt, for the younger generation seem to think there is something disgusting about that useful article, and, with an overwhelming confidence in their own vesical sufficiency, have no thought for the less fortunate older people. If anyone doubts this, let him stay in the house of a young couple. When he wakes in the early hours—as, if he is a sexagenarian, he will probably do with symptoms which demand relief—he will grope in vain under the bed for the familiar friend and though the bedside table may have on it some flowers, a box of biscuits and a few of the latest *Penguins*, the cupboard below will probably be as bare as Mother Hubbard's. The only thing to be done in such a situation is to get up in the chilly dawn, grope one's way along an unfamiliar passage hoping that one will not barge into another bedroom, and seek out the lavatory. When this has been "determined, dared and done," one is afraid to pull the chain for fear of waking the other inmates and on getting back to bed it will probably be found that sleep has fled for the rest of the night.

Nor are these nocturnal excursions devoid of danger. Apart from the risk of chill I have known a case in which an elderly lady when engaged on such a quest fell through a window and sustained fatal injuries. The disappearance, moreover, is not confined to private houses; it is spreading to hotels and the male visitor may have to suffer the embarrassment of ringing for the *femme de chambre* to bring a *pot de chambre*. In the younger countries, as might be expected, the evil is most advanced. In America, of course, every bedroom is supposed to have its own bathroom and lavatory (though even the step or two to reach this may thoroughly wake one up), but in Australia I have occupied a guest room which, save for the presence of a bed, might have been a sitting-room, for it contained no toilet facilities whatsoever—not even a carafe of water; the guest, I understood, was supposed to use the family bathroom for all purposes, even, it is to be presumed, as a parking place for his dentures—for in these ultra-democratic countries it is considered beneath the dignity of anyone to empty a bedroom utensil.

What the consequences to the health of the elderly of the disappearance of Jerry may be I leave it to the genito-urinary surgeons to determine, but not with much hope, as they seem quite ignorant of the cause of the call to empty the bladder in the early hours which so often affects those of advancing years of both sexes. Meanwhile I am convinced that in England now the disappearance of the "chamber" is a fresh and growing evil and when we have swept the German Jerry from the skies one of the first steps in reconstruction should be to restore the British variety to his old place in our bedroom. A lunatic whom I met many years ago set a good example in this respect. He cherished the delusion that he was the Ruler of the Universe, and in consequence was an inmate of an asylum under the care of the late Sir Thomas Clouston, an eminent psychiatrist in his day but perhaps better known to the younger generation as the father of the author of "The Lunatic at Large." One day Clouston was going his rounds with a crowd of students (of whom I was one) and in passing from one block of the asylum to another came across this patient, known as Jock, unpacking a number of crates full of chamber-pots. "Man Jock," said Clouston in his kindly way, "that seems rather a strange occupation for the Ruler of the Universe." "Weel, doctor," replied Jock, "I maun fill up the spare moments." I wish the modern housewife, who presumably is not so busy as one who rules the universe, would fill up a little of her spare time in the same manner.

* * *

The telephone rang in the officials' dining-room and was answered by the deputy official in charge. "The engineer reports that there is a good deal of smoke coming into the air inlet, should he shut off the fan?" The deputy official in charge (whose life would be impossible unless he could promptly pass on to someone else the responsibility for making decisions) turned to the medical officer, "What do you think, Doctor?" The M.O. had to do a little quick thinking. It had been decided long ago that the air-conditioning plant should be shut off if there was a report of poison gas, but no instructions had been issued as to procedure in case of a smoke attack. Now that the matter had been mentioned, we noticed that there was, in fact, a slight smell of smoke in the room—it was curious that no-one had noticed it before. We telephoned to the observation post on the roof—was there a fire near us? "Nothing very near, but there are several quite big fires in the City." It was decided to keep the fan going, it could be stopped later if the atmosphere became unpleasant.

After dinner the medical officer, accompanied by the officer of the guard, each wearing his "tin hat," went up to the roof to investigate, having first ascertained that there was "not much coming down now." There was a good deal more smoke on the top floor than there had been in the central control-room down below, and when we opened the door to the roof we were met by a warm blast, laden with smoke and a few sparks. It was almost as bright as day, but with a red glow, which seemed to cover the whole City. One's first impression was that we were like Shadrach, Meshach and Abednego, walking unharmed in the midst of a burning fiery furnace. But a moment's further observation showed that most of this glow was merely reflected from a pall of smoke hanging over the City, and that actually the buildings involved could be counted—one down by London Bridge, another in Queen Victoria Street, a big blaze in the far end of Cheapside, and one or two more in the west end of Gresham Street. The tower of St. Stephen's, Coleman Street, had disappeared into a mass of glowing ruins. St. Laurence's Church at the corner of King Street was well alight, and a stiff breeze from the south-west was blowing the flames across the delicate Gothic spire of Guildhall, which was silhouetted sharply against a wall of flames rising from the hosiery warehouses in Wood Street.

It is strange what frivolous thoughts obtrude themselves at such moments. "Do you remember," remarked the M.O. to his companion, "that not so long ago St. Laurence's was appealing for funds to extirpate the death-watch beetle from its roof rafters? That little problem is solved, anyhow." But the officer of the guard was scanning the northern sky-line anxiously. "What's that big place up there?" he asked, pointing towards Finsbury Square, where a tall building was belching flames from its roof, "That must be near our place" (he wears the uniform of the Honourable Artillery Company). All round the ancient parade-ground (that singular oasis of green just north of the City boundary) the fires were eating up warehouses and offices—two banks were on fire, the offices of a well-known City lawyer, and several houses which had stood since the days of the French Revolution, in one of which three dentists afterwards found the charred remains of their equipment lying in the cellars, under tons of debris. Shops and warehouses further north added to the blaze, and there

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were two smaller fires down in the East End, and one near the Port of London Authority's offices on Tower Hill (this was probably Trinity House, afterwards reported to have been burnt out).

As we watched the destruction one of our firemen said, "There goes the Guildhall," and we saw the first little tongues of flame licking round the south side of the base of the Gothic spire; within a few minutes the whole of this spire was involved, its delicate lattice beams showing black against the background of red, now brighter than ever, as more fires were springing up where a large brewery was adding its contribution to the toll of loss (eighty horses were killed there.)

We did not stay long on the roof—for one thing it was not very comfortable, also we had to think how to adapt our arrangements to deal with this new situation. Even before the war began we had read of the experiences of other bombed cities, and made plans to deal with the possibility of not being able to evacuate our casualties. Now it looked as though these plans would have to be put into effect. With the fires raging all round it seemed unlikely that the streets would be passable in any direction by ambulances. We were left to our own resources, and attention was turned to reckoning these up. First of all, who was available among our hundreds of trained ambulance personnel? The answer was furnished by the "signing-on" book at the front lodge—as it happened, none of those who had taken the trouble to register their arrival had made any entry in the column "A.R.P. Service," and only 37 names appeared in the book. However, a few inquiries showed that we could raise a team of first-aiders, and the guard would supply stretcher parties; they had been well trained, and had practised carrying their heaviest member (who tips the scales at about 18 st.) down the narrowest and most crooked staircase in the building. Equipment was checked. Here was the little box of Tubunic syringe-ampoules (one cannot expect to be able to charge a syringe in the dark or under a mass of debris with one's hands covered with dirt). First-aid dressings? Splints? Just here. Triangular bandages? Cotton-wool? All present and correct.

While we were looking through these things we heard machine-gun fire from outside; so they were attacking the firemen in the streets? It was not till next day that the official explanation was given—our own planes were up, attacking the raiders by the light of the fires. Soon after this we went up to the observation-post again to see how things were going on. No more planes were to be heard, and there were no new fires near us, only round St. Paul's we could make out a conflagration which had not been apparent before; the cathedral itself appeared intact, but by now the roof of Guildhall had fallen in, and there were many gutted buildings to be seen—black walls, with blind window-spaces glowing red, and ragged ends of beams or twisted girders projecting over a smoking void. The roar of flames mingled with the crash of falling ruins, and there was a constant hum of fire pumps in action in all directions. The nearest fire was about fifty yards away where a five-story office building had been hit by an incendiary bomb; there had been no-one available on the spot to put it out, with the result that the whole block was destroyed. It seemed a pity; one man with a bucket of sand could have saved this place; even without any appliances he might have kicked the bomb over into the street, as had been done many times before.

There were many late arrivals at the office next day, and it will be a little time yet before the bus services can be restored, especially on the western routes from the heart of the City, but many of the firms whose premises were destroyed had opened temporary offices within a day or two. There will be a prodigious deal of clearing-up to be done; already the authorities are at work with dynamite, pick and shovel. Let us hope that advantage will be taken of the present desolation to carry out much-needed street widening and other improvements in this ancient but uncommonly congested district. No doubt the drift of offices towards the West End will be accelerated. One mourns the loss of much of great historical and sentimental value—nothing can restore the lost Wren churches or the destroyed halls of the Livery Companies—but there is consolation in the thought that very few people were injured or lost their homes, and the effect on the production of munitions or advancement of our war effort must be almost if not quite negligible. Above all, one is glad to note that there has been hardly any talk of reprisals. The destruction was great, but it is difficult to see what good would come of any attempt to repay in kind. The world would be the poorer if we were to burn the architectural treasures of Germany; the proper answer, surely, was the terrible raid on the docks and factories in Bremen, from which come so many of the offensive weapons which have wrought this evil on our towns, ships and people.

* * *

Hospital life can be at its best at Christmas, especially when, as in a hospital like ours, few patients happen to be critically ill. Preparations, of course, involve weeks of planning and weeks of work but the work is pleasant if tiring and dear to the heart of nursing and medical staff alike, except when an amateur carpenter hits the wrong thing, as sometimes happens. Decorations are everywhere and the effects are dazzling, sisters vieing with sisters, and tropical suns with gipsy caverns and snow-storms that make it almost impossible to pilot a bewildered way from one part of the hospital to another. Holly was plentiful but mistletoe apparently priceless above rubies, and what is hospital at Christmas without mistletoe? To make things worse there had been a corner in such mistletoe as did reach the hospital and nearly all of it hung in a corridor near the duty room of a particular ward, guarded by a she-dragonly sister and her cohorts. The other sisters were disconsolate and in the goodness of our heart we decided to promote redistribution of wealth by stealing some of Ward E's treasure to lighten the darkness elsewhere. It was not so easy to carry through the theft, for the guards were diligent and more than once we had to make a hurried and undignified scramble from the precarious height of a cupboard that offered prospect of access to the prize. But at last the deed was done and the booty carried in triumph to another place with a fine sense of elation and total disregard of morality. Incidentally, there lives in the same duty room in Ward E a budgerigar of doubtful ancestry and melancholic mien that, fortunately, has not so far been known to talk, though every morning it looks sorrowfully at a respectable egg presented to it by one of its uncles with an exhortation to go and do likewise.

For the patients there was the usual festive round—carols, Christmas stockings, Christmas dinners, ward tea-parties with Christmas trees, and all sorts of colourful entertainments, conjurors, puppets, pantomime, exhibitions of dancing and cinema shows, with modern talkies competing with Harold Lloyd and Charlie Chaplin. The operator of one of the talkie machines seemed to have a flair for photography and would insist on "taking" some of the matriarchal members of the staff; he explained, seemingly without malice, that he had spent all the morning in photographing antiques for a catalogue. The fortunes of the medical staff in the carving of turkeys were very varied. Not even all the surgeons acquitted themselves with high distinction and there can be few more humiliating positions for any young surgeon than to find himself baffled by a stupid bird. But indifferent success did not deter even the less successful from perambulating round the wards attired in bespattered white raiment, with the glint of satisfaction that ought to belong to a good deed well done.

Ward tea-parties on Christmas afternoon are calculated to tax the stoutest digestion; we attended five in the space of a couple of hours and by limiting the intake at each to one cup of tea and one sandwich were enabled to stay the course. There was community singing, spirited if none too harmonious, and cup reading with all the thrusts born of inside information; and, above all, Christmas trees with Father Christmases. One of these benevolents bleated in a cracked voice in the course of his oration that it was a cold dark night and that he had come a long way: he certainly looked as if he had done so but consented to be suitably revived and to proceed with his legitimate business. Nor were the staff altogether forgotten. Maids and porters, administrative staff and doctors, nurses and orderlies all had their several occasions and interesting studies they made. For the porters the inevitable dinner followed by a variety show; for the maids a dinner followed by a dance (how curiously

reluctant they were to start to dance); for the senior staff a dinner with as its only toast the health of the Matron (a grand subject on such a privileged occasion for some judicious leg-pulling thinly veneered with historical honey) and then a conjuror, complete with rabbits, and some simple old knockabout silent films well suited to the occasion, for this was an occasion on which even Homer might nod with impunity. For the nurses, more dinner and dance, and for the registrar and his orderlies a nice long dinner, washed down with copious beer; and thereby hangs a tale. It had been appreciated in good time that plenty of beer was essential to the success of this function and the necessary steps had been taken. Nigh on a week before the day of days a barrel of beer had arrived at the hospital and had been placed, with supporting bottles for the ultra-genteel, under closest arrest. Then on Christmas Eve out of the blue stark tragedy befell us: the barrel was found to be empty and lying beside it was one of our own painters who had apparently found a series of ways past the outer guards during the preceding days and was now thoroughly carefree. Unfortunately, the erring painter was a member of the civilian staff of the hospital, which did nothing to soften the blow. The atmosphere was tense, the Major shaken, the Sergeant-Major hysterical. Time was short, for a dinner without beer would be worse than Hamlet without the prince. But all was not lost; a new and better barrel was secured with two hours to spare, and on this occasion all painters were placed under close arrest and the feast went right merrily. So far as we could gather the hospital enjoyed its Christmas. There certainly was abroad the spirit of goodwill and carnival, and in these days goodwill and cheerfulness are half the battle.

Letters to the Editor

DYSPEPTICS IN THE ARMY

SIR,—There will be general agreement with the opening sentence of your leading article of Jan. 11, that from several points of view dyspepsia is the most important medical problem of this war. You rightly insist that no man who presents definite evidence of having suffered from an ulcer should be accepted for service in the Army. With this exception dyspepsia should not be regarded as a reason for rejecting a recruit.

When a soldier is admitted to hospital on account of dyspepsia it is of the utmost importance that a definite diagnosis should be made with a minimum of delay. It should be possible with a well-taken history combined with radiological examination, chemical and spectroscopic examination of the stools for occult blood, fractional test-meal, and in doubtful cases gastroscopy, to decide with a high degree of accuracy within a week whether he has an ulcer, or gastritis of sufficient severity to be the cause of his symptoms. When these conditions as well as cholecystitis and other possible organic causes of dyspepsia have been excluded, the dyspepsia can be regarded as functional, except in the comparatively rare cases of malingering. Incidentally there should be no confusion between functional dyspepsia and malingering such as crept into your leader.

When an ulcer is diagnosed the soldier should be invalided from the service forthwith. The soldier with functional dyspepsia should be given a rapid course of treatment to restore his ability to eat ordinary army food and face ordinary army life. The malingerer should be sent straight back to duty and the facts recorded on his army papers.

In your leader it is suggested that a proper investigation could best be carried out in an E.M.S. hospital. With this I profoundly disagree. There are today as many expert gastro-enterologists, including gastroscopists, in the Army as in civilian practice, and in many instances their expert knowledge is being wasted in routine and administrative duties. Moreover, there is no doubt that for the second group of cases—the functional dyspepsias—the discipline of a military hospital and treatment by an officer in uniform is far more likely to be effective than treatment in the very different atmosphere of a civilian hospital. An extensive experience of visceral neuroses, both alimentary and circulatory, in the last war convinced me of this, and what I have seen and heard during the past year has only confirmed me in this belief. Delay in the proper treatment and disposal of functional dyspepsias is likely to produce a genuine "soldier's stomach" or "D.A.S.," corresponding to the so-called "soldier's heart" and "D.A.H." which are genuine enough, though they are the products of bad treatment and not of army life as such, so ought never be allowed to develop.

I believe that the time has come for the establishment of special army hospitals, as suggested by Professor Schindler (*Brit. med. J.* 1940, **1**, 243), staffed by medical officers with experience in gastro-enterology together with clinical pathologists and expert radiologists who (*pace* the writer of your leader) should be capable of recognising at least 95% of chronic gastric and duodenal ulcers. There would be three entirely distinct divisions of the hospital. The patient would be admitted into division A for diagnosis and he would remain there for about a week whilst the investigations were being carried out. When the diagnosis is established the patient is at once transferred to division B if suffering from organic disease and to division C if from functional dyspepsia. If he is malingering he is discharged direct to his unit. A patient in division B receives appropriate treatment, and if suffering from ulcer steps are taken for his immediate discharge from the Army and his transfer to a civilian hospital, where the treatment should be completed and advice given to enable him to keep well enough to do useful work in civil life. Patients with gastritis will generally be treated with sufficient success to make it possible for them to return to full duty or ordinary diet. In division C the patient would be treated by medical officers with a knowledge both of gastro-enterology and simple psychotherapy. This should never last for more than three weeks, during the last of which he should be taught that he is quite capable of digesting ordinary army food in spite of any preconceived notions he may have to the contrary, and he should be occupied all day. He is then sent to duty with a note on his records that a full investigation has excluded organic disease. Only under very exceptional circumstances should he be sent back to hospital or reinvestigated in less than a year. A small proportion of cases admitted into division C will prove to be hopeless hypochondriacs who should be discharged from the Army but without a pension.

With an organisation such as I have outlined there would be an enormous saving of man-power both for the Army and for civilian services with a corresponding saving in money and in occupied hospital beds.

Oxford. ARTHUR HURST.

SAVING THE PREMATURE BABY

SIR,—In his article of Dec. 28 on Pædiatrics, Past, Present and Prospective Sir Robert Hutchison honours me by quoting my work. He says "Collis . . . thinks that 20% of neonatal deaths are preventable." I am sure of it, for in the last decade we have reduced the neonatal mortality in the immature group at the Rotunda Hospital by over 50%. Continuing he remarks: "This may be, but I confess I cannot get up much enthusiasm for trying to save these premature arrivals: I have a strong suspicion that, of those who survive, a large proportion turn out defective either physically or mentally or both. . . . One cannot help wondering, indeed, whether the stinting production and careful saving of infant lives today is really, biologically speaking, as wholesome as the mass production and lavish scrapping of last century."

In private the famous "Hutchison cold douche" has done us all good in our day, especially as it was always administered in such an inimitable manner that the over-enthusiastic young worker was left with his initiative unimpaired and at the same time a new objective attitude to his work. But when Sir Robert Hutchison from the Olympian height of the President's chair makes a statement like this it is quite another matter. He has no right to "have a strong suspicion" about a matter as important as this. Let him ask any of the pædiatricians who have been fighting their way into the strongholds of the obstetricians what are the facts

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and he will discover that premature infants, if without congenital stigmata and given special care, will grow into as normal people as other babies. He will be told that these babies often are very much wanted by their parents and that at no other time does the physician receive more heartfelt thanks than when he has helped one of these infants to survive. Indeed he will discover that he has done pædiatrics no small disservice by these too easy remarks. For the battle with the obstetricians and the midwives has not yet been won—not by a long way. There are hundreds of maternity homes in these islands where babies are not yet even kept on a temperature chart and where any immature baby has scant chance of survival. These remarks of the President are the best ammunition that the enemy has been given for many a day.

In the city of Dublin there is no "stinting production" or for that matter "careful saving of infant lives," but I disagree most profoundly that our high infant mortality is a thing to be proud of even if it is biologically excellent. Indeed if I was not in such awe of Robert Hutchison I would be inclined to say that he was talking dangerous nonsense. Would he have us cease to be physicians and become biologists, dreaming of a materialist millennium in a planet doomed itself to cease in time, so that the individual shall no longer mean anything to us and we must think only of the family, of the group, and finally of that nebulous monster the state? That were the end of medicine. Surely the whole essence of our calling is to do our best for each case as it comes to us, be it an unconscious 3 lb. mite, and leave the rest to God.

Dublin. ROBERT COLLIS.

SAVING ON DRUGS

SIR,—In view of Dr. M. H. Pappworth's paper it seems desirable to draw attention to changes in the classification of magnesium and aluminium salts in the Memorandum on Economy in the Use of Drugs (of which a revised edition will shortly be issued) prepared by the therapeutic requirements committee of the Medical Research Council. The manufacture of magnesium sulphate is discouraged because it has to be specially prepared for materials which are in short supply, whereas large quantities of the substitute, sodium sulphate, are available. On the other hand, there are adequate home supplies of the oxides, carbonates and trisilicate of magnesia. The preparation of aluminium hydroxide from potassium alum is discouraged, but there are abundant supplies of other aluminium salts from which it may be made. There is therefore no call to restrict the use of the valuable antacids of the aluminium and magnesium series, which already before the war had replaced bismuth in the practice of many prescribers.

Oxford. L. J. WITTS.

SIR,—I note with some surprise that in his paper of Jan. 4 Dr. Pappworth includes kaolin in the category of antacids, and there seems to be a widespread idea that kaolin reduces the effective acidity of the gastric contents. To the best of my knowledge, kaolin acts as a negatively charged colloidal substance and may soothe an irritated mucosa and adsorb poisons, but it plays no part in altering the acidity of the stomach content.

Carlisle. T. McL. GALLOWAY.

TOO MUCH VENTILATION

SIR,—The experiments which Dr. Copeland asks bacteriologists to carry out on animals have been done by Arctic travellers who, though they are exposed to the utmost degree of cold and have to thaw out ice inside their sleeping-bags, do not suffer from colds. It is stuffy, dusty, artificially heated rooms, and particularly schools, which occasion colds and other infections spread by exhaled droplets. In the town of Cuenca in Ecuador, situated high up in the Andes, the climate at times is very cold, but the inhabitants have no artificial heating because they recognise that it produces illness. In schools where children who are well fed and clothed live and sleep in the open air, even in the climate of Salford, there is practically no illness. There have been no epidemics due to shelters because people have to go out of their stuffy germ-polluted rooms and while passing to and from the shelters are exposed to open air and exercised, and the shelters too are mostly not artificially heated. In the tubes there is through ventilation. So long as water is not polluted, good food is adequate, and mosquito- and liçe-borne diseases are kept away, stink does not matter except from an æsthetic point of view. For thousands of generations cave men survived filthy conditions. When lumberers in Canada were given artificially heated closed wooden huts in place of open-air shacks to sleep in an epidemic of rheumatic fever resulted. The high incidence of pneumonia in the United States is to be attributed to the over-heating of houses. In the last war our soldiers exposed in cold, wet and filthy trenches and dug-outs did not suffer from colds and pneumonia. But be it noted, epidemics of influenza, as in 1918, sweep through the world wherever infection is carried, under any conditions of climate.

Chalfont St. Peter. LEONARD HILL.

ANÆSTHESIA IN THE SHOCKED PATIENT

SIR,—Recent correspondence on this subject, together with some articles which have appeared on the value of local anæsthesia and continuous Pentothal, have served to clarify an opinion I have long held—and which I am sure is shared by anæsthetists of repute—that the alleged toxicity or safety of any particular anæsthetic drug or method is of less importance than the skill and experience of the anæsthetist who administers it. In my own hands I find cyclopropane the most valuable agent for shocked patients, since it gives good relaxation (when this is required) without any anoxæmia, it is non-irritating to mucous membranes, and promotes a quic recovery with a greatly reduced postoperative morbidit,.

In gaining experience of different methods of administration the coöperation of surgical colleagues is essential for success, for apart from more scientific criteria the prejudices of each individual surgeon have to be satisfied. One surgeon may not be prepared to work under a system of anæsthesia, such as local or spinal, which may suit another admirably. My preference in favour of cyclopropane may have been largely determined by the fact that I have had the opportunity to devote much time and thought to gaining experience with this drug and perfecting, so far as I am able, the technique of its administration. Yet it cannot be denied that, other things being equal, anæsthetic drugs do differ in their toxicity. Chloroform is a general tissue poison, ether is highly irritating to lung tissue, while spinal, local, continuous pentothal and even nitrous oxide have their own limitations.

Nevertheless, no drug or technique is of universal application, and the best results are often obtained if the skilled anæsthetist is allowed to choose for each patient a method of administration in which he is expert.

Emergency Base Hospital, Ilford. R. BLAIR GOULD.

PSORIASIS AND RHEUMATOID ARTHRITIS

SIR,—I am surprised Dr. Shackle "could find no reference to the association in the literature either of rheumatism or skin conditions," for the recognition of arthropathic psoriasis dates from the time of Alibert (1822). Bazin (1860) made a distinction between psoriasis arthritica and psoriasis herpetica. Since then the literature has become extensive. For example, Bourdillon (1888) wrote a thesis on "Psoriasis et Arthropathies," and Kutznitsky (1897), Adrian (1903) Menzen (1904), Waelsch (1910), and Brocq (1910) hav discussed the syndrome. Garrod and Evans (*Quart. J. Med.* 1924, **17**, 171) described three cases of it, referr briefly to the literature, and commented on certai peculiar features of the arthritis as compared with non psoriatic rheumatoid arthritis, such as the frequency of intermittent hydrarthrosis. More recently American writers in particular have emphasised these peculiarities, to my mind the most interesting one, to which I drew attention in my paper on "The Skin Manifestations of Rheumatism," being the involvement and deformity of the *terminal* interphalangeal joints of the fingers and toes, together with severe psoriatic changes in the correspond-ing nails.

With regard to the question of bacterial sensitisation in these cases, as I pointed out in the above paper, I believe this is causative in some but not in all. In one patient, whom I have had under observation for ten

years, there was no reasonable doubt that severe focal infection in several dead teeth was primarily responsible for both the psoriasis and the arthritis. But in the cases described by Garrod and Evans there was no evidence that focal infection played any rôle in the development or course of the syndrome, and this has been frequently my own experience. Another patient referred to in my paper was of interest in that the syndrome was apparently provoked by severe gout with secondary osteo-arthritic changes in several joints. Her blood uric acid was 10·3 mg. per 100 c.cm. In both my patients the involvement of the terminal interphalangeal joints, with psoriasis of the corresponding nails, was a striking feature.

Devonshire Place, W.1. H. W. BARBER.

MEDICAL PLANNING COMMISSION

SIR,—Your leading article of Jan. 11 raises important objections to the origin and general conception of the B.M.A. Commission. As you say, there is a real danger that such "gatherings tend to regard themselves as more representative than they are, and to produce a finished scheme as agreed by the profession when nine-tenths of it have had no chance to approve or disapprove." The secrecy which has surrounded the present movement gives point to your observation. The first reference to it in a medical paper was I believe in a letter from me in your issue of Nov. 23 (p. 666), when I was blamed for giving away a movement which it was desired should remain unrevealed. The studied suppression in the *British Medical Journal* of any reference to the not unimportant movement it was conducting "off stage" is significant of its desire to avoid the publicity which you rightly urge should characterise its future moves. The reference of the commission, as officially expounded, obviously might include the whole position of medical practice, medical education, and the future of voluntary hospitals. These are matters which deeply interest and materially concern the general public as well as the profession. Sixteen years' continuous membership of the House of Commons have impressed upon me the conviction that that assembly, widely accepted as giving a reliable cross-section of public opinion, has little respect and still less affection for the B.M.A. To entrust to the B.M.A. the dominant rôle in determining the future of medicine is to court the derision and the failure which followed its earlier scheme for the Emergency Medical Service. The new commission will be as surely dominated by the B.M.A. as is the Central Medical War Committee, which differs in little else than name from the Central Emergency Committee of the B.M.A. from which it grew; indeed, the Central Medical War Committee bears a strong family likeness to the B.M.A. Commission as now planned. I have sufficient familiarity with political societies, in which category the B.M.A. avowedly takes its place, to know that a small homogeneous executive enjoying continuity of membership and geographical cohesion will always control policy in competition with an unwieldy heterogeneous widely scattered body of seventy members, of which, as you point out, about a third are B.M.A. representatives, and the addition of outsiders with no bond of common interest cannot result in any serious deflection of predetermined B.M.A. plans. May I submit the following considerations:—

(1) The younger members of the profession are mostly at the moment immersed in the war effort, and cannot participate even if invited (which so few have been) in the work of the commission which affects their future more particularly.

(2) Non-medical bodies—e.g., universities, hospital boards of management, local authorities, and the vast congeries of working-class organisations interested in the future of medical services—should be in a position to express their wishes as to the organisation of post-war medicine in all its aspects.

(3) The economic developments which inevitably will result from the war must materially affect programmes of reform. Decisions and even recommendations recorded during the war are surely premature.

It would be wiser, I submit, to plan a commission with much wider authority and commanding more general national acceptance than a single strongly prejudiced medical body can hope to receive. It is these considerations that have prompted me to put down a question on the Order Paper of the House of Commons in the following terms:—

"To ask the Prime Minister whether his attention has been drawn to the formation by the British Medical Association of a Medical Planning Commission to consider problems of reconstruction and reorganisation in the field of medicine in the post-war era, a reference which obviously includes questions on medical practice, medical education, and the position of the voluntary hospitals, and whether in view of the complexity of these problems and the importance to the public as well as to the medical profession of such reorganisation, he will consider the desirability of appointing a Royal Commission to conduct this inquiry with the ultimate purpose of appointing an independent Government commission to regulate this reorganisation, instead of entrusting this reform to only one body (and not the most representative or most authoritative of several medical bodies) whose recommendations could not command the general assent which would be accorded to a Government inquiry."

Wimpole Street, W.1. E. GRAHAM-LITTLE.

AGAINST THE THREADWORM

SIR,—With reference to your excellent and cautiously worded leader (Jan. 4, p. 16) on the action of phenothiazine as a remedy against threadworm infection, I would point out that in two of the cases quoted in my paper all the customary remedies—including quassia, santonin, beta-naphthol and hexylresorcinol—had previously been tried out in vain.

Harley Street, W.1. PHILIP MANSON-BAHR.

REGISTRY OF LYMPH-NODES

SIR,—The need for a registry of lymph-nodes called for in your leader of Jan. 11 has already been satisfied, and the collation is being done by Dr. Robb-Smith at Oxford.

Westminster Hospital, S.W.1. MAGNUS HAINES.

DRY DRESSINGS

A MILITARY correspondent writes: Lest your readers may be led into thinking that the Army is persisting in the use of an obsolete method of dressing wounds in the first instance, may I hasten to assure Major Porter that, although the present pattern of first field-dressing is enclosed in an inner wrapper of waterproofed material, this is intended solely to prevent damage to the dressing by damp, and is discarded along with the outer wrapper of cloth when the dressing is taken into use. Although the material is thrown away, it can hardly be said to be wasted.

Infectious Disease in England and Wales

DURING THE WEEK ENDED DEC. 14, 1940

Notifications.—The following cases of infectious disease were notified during the week: smallpox, 0; scarlet fever, 1546; whooping-cough, 2505; diphtheria, 1392; enteric fever, 19; measles (excluding rubella), 15,278; pneumonia (primary or influenzal), 866; puerperal pyrexia, 112; cerebrospinal fever, 169; poliomyelitis, 10; polio-encephalitis, 1; encephalitis lethargica, 1; dysentery, 78; ophthalmia neonatorum, 76. No case of cholera, plague or typhus fever was notified during the week.

The number of civilian and service sick in the Infectious Hospitals of the London County Council on Dec. 20 was 2080, including: scarlet fever, 282; diphtheria, 322; measles, 846; whooping-cough, 91; enteritis, 25; chicken-pox, 189; erysipelas, 44; mumps, 28; poliomyelitis, 1; dysentery, 9; cerebrospinal fever, 28; puerperal sepsis, 5; enteric fevers, 2; german measles, 2; other diseases (non-infectious), 94; not yet diagnosed, 112.

Deaths.—In 126 great towns there was no death from smallpox, enteric fever or scarlet fever, 10 (0) from whooping-cough, 12 (0) from measles, 53 (2) from diphtheria, 40 (0) from diarrhœa and enteritis under 2 years, and 33 (8) from influenza. The figures in parentheses are those for London itself.

Fatal cases of diphtheria were scattered over 33 great towns, Liverpool reporting 4, Leeds and Swindon each 3. There were 5 deaths attributed to influenza at Birmingham. Liverpool reported 4 deaths from measles, and Manchester 6 from diarrhœa.

The number of stillbirths notified during the week was 187 (corresponding to a rate of 41 per thousand total births), including 12 in London.

Public Health

WAR AND WATER

WATER-BORNE disease has often in the past done more to decide the issue of wars, and certainly to settle the fate of cities, than force of arms. The advance of military hygiene and the protection against typhoid given by inoculation greatly reduced the risks of water-borne epidemics in the campaigns of the present century, but in this war, in which aerial attack on cities is playing a predominant part, the danger has returned; for though the water-supplies of towns are almost proof against contamination in peace-time, in war they are highly vulnerable in their weakest spot—the system of pipes by which the water is distributed. The risk of poisoning the main supplies directly by chemical or bacteriological agents used by the enemy is negligible, but he could achieve the same object indirectly by breaking the mains and so permitting the water to become contaminated if we were not aware of this danger and ready to deal with it. Lieut.-Colonel E. F. W. Mackenzie, director of water examination to the Metropolitan Water Board, has lately described[1] the interferences with water mains which have occurred in the battle of London, and the means adopted to minimise their dangers. He is not directly concerned with the engineering problems of fractured or destroyed mains, or with the inconveniences of lack of water-supply, but with the greater danger of the supply when restored being infected with the parasites of epidemic diseases. In cities this danger is great, for the soil in which the pipes are laid is foul and owing to the presence of carriers must be persistently infected with the agents which cause water-borne disease. As the pipes which convey water are usually near those which convey sewage and both are apt to be opened by the same explosive bomb, direct connexion between them may be established with resulting heavy contamination of the water. The high pressure in the mains deters entry of other matter into them while the system is sound, but on fracture this pressure falls, repair requires the flow to be stopped and the repair itself must be effected in contaminated surroundings, so the flow when restored is bound to be foul unless adequate means are taken to ensure that it is not. In the fractures which occur in ordinary circumstances it is not difficult to assure that the flow when restored is pure, but in those due to bombs the explosion may force foul matter into the main for a great distance. Colonel Mackenzi relates that in one instance debris was found in the upstream end of a main 600 ft. from the point of injury, and in another a mass of clay weighing a hundredweight was forced 100 ft. up an 18-in. main. As he says, these effectively dispose of any belief that pollution is prevented from entering a main by the water pressure existing therein.

After several trials, a technique of chlorination was adopted which is giving adequate results. Mobile chlorinators have been designed consisting of trailers each carrying six chlorine cylinders, a pump driven by a petrol engine, suction and delivery hose and a work bench. Drivers and vehicles are reserved for towing the trailers—thus a chlorinator is not put out of action by a breakdown of the towing car, it can always be hitched to another one. These chlorinators have been operating for many weeks now; they spend much of their time in standing by, but this cannot be helped if delay in getting the mains into action is to be avoided. It was thought at first that in mains not obviously polluted with sewage 1 part per million of chlorine with one hour of contact would be effective, but it soon became clear that sewage pollution was not easy to detect on sight, and the dose was raised to 10 p.p.m. in every case. The aim is to distribute heavily chlorinated water throughout the whole section of the fractured main which has been isolated. Stabilised bleach is introduced into small mains in quantities sufficient to give the proper concentration of chlorine in the estimated capacity of the main, and the chlorinated water is forced back through the repair by manipulation of valves and hydrants. The chlorinated water is afterwards washed out. Large mains are charged with pure chlorine from the cylinders, introduced at the point at which the main is recharged after repair. The main is allowed to stand fully charged with chlorinated water for 15 minutes. The chlorinated water is not as a rule allowed to pass into supply; the high concentration of chlorine makes it desirable to empty the main and recharge it first. But if for some reason it is impossible to empty the main the dose of chlorine should not be reduced. People realise that a taste of chlorine means that the water is safe, and are not likely to complain about it. Moreover, by dropping a small crystal of hypo into the kettle or water jug they can get rid of the taste. In 100 ml. samples drawn from small and large mains treated by these methods no coliform bacilli have been found. Samples drawn at random throughout the area of supply have also proved negative. Chlorination of large mains is carried out by supervisors acting under the orders of the director of water examination. The areas are divided into districts, to each of which a supervisor is appointed, and he has two mobile chlorinators and a towing car at his disposal. Each chlorinator has its own attendant. The supervisor can take one chlorinator to a main, make arrangements for chlorination and leave the attendant to carry them out; he can then return in the towing car to collect the second chlorinator and start it on another main; leaving this, he returns to the first main in the towing car and performs the necessary tests. Information is recorded in a card index in the director's office.

1. Published simultaneously in *Water and Water Engineering* and *Med. Off.* Nov. 30, 1940.

From the Annual Reports

SHOREDITCH

Dr. E. H. R. Smithard says that his report for Shoreditch is curtailed to the point where it ceases to have much value, and as it was written in early October it is distinctly gloomy and anxious. Yet it records a year of remarkable healthiness and not a little progress. Since the quinquennium 1893–97 the population of Shoreditch has fallen from 121,749 to 77,280; its annual births from 4266 to 1113, and its deaths from 2744 to 942. The fall in population, entirely due to emigration, is greatly to the benefit of Shoreditch, of London, and of the whole country, for Shoreditch is not a population unit but a densely overcrowded district of the Metropolis which in the course of development of the capital had sunk from a delectable residential estate for the merchants of London to what really must be considered either an actual or potential slum. That the health of Shoreditch has benefited greatly by depopulation is obvious. In the last years of the nineteenth century its infantile mortality was 196. Forty years later it had sunk to 64 and in 1939 reached the very low level of 31. Its birth-rate declined from 35·0 to 14·4 and its death-rate from 22·5 to 11·4 in 1938, though in 1939 it rose again to 12·9. In 1939 its maternal mortality, which with that of the other East End boroughs had been low for many years, sank to 1·84. The only unfavourable feature of 1939 was a rise in tuberculosis mortality to 1·1 per 1000 population.

In 1939 Shoreditch secured after some opposition a convalescent home for children aged 2–5 at Mayfield near Tunbridge Wells. Dr. Smithard says this is a corner of the triangle for the care of infants, the other corners being a dietetic ward at the Model Welfare Centre and a day nursery, both of which are held up by the war. As evacuation of children from Shoreditch has been extensive and should be complete, nothing is lost by holding up infant welfare work during the war, on condition that when peace is in sight there will be no delay in getting things going before the evacuated population returns.

CHELMSFORD

Dr. J. Mervyn Thomas, who was appointed M.O.H. for Chelmsford in December, 1939, on the resignation of Dr. Andrew Dick, reports that the town has grown considerably in recent years, its present population being 32,390 whereas at the census of 1931 it was 26,537. In 1939 the infantile mortality was 16·6 and maternal mortality nil. Of the 305 deaths which occurred in that year, 110 were in persons over 75 years of age, and 173, or more than half, in persons over 65. Yet the deaths from cancer were only 25, giving the exceptionally low mortality-rate of 0·77 per 1000 population. There were no deaths from diphtheria, and poliomyelitis, from which Chelmsford suffered severely in 1938, was absent in 1939.

KILMARNOCK

Two points of social interest in Dr. Bryce R. Nisbet's report for the burgh of Kilmarnock are that the corporation owns several reservoirs but not their gathering grounds; and the corporation now owns 30% of the houses in the burgh. The average daily consumption of milk per person was 0·4 pint. The population in mid-1939 was 40,417. There were 488 deaths, of which 55 were due to cancer, giving a rate of 1·36, or nearly double that of Chelmsford. The tuberculosis mortality was 0·57, which is very low, as the average for the large burghs was 0·87. An investigation into the reason of absence of children from the primary schools revealed that the four most frequent causes were coughs and colds, 3751 days; tonsillitis, 1560 days; scarlet fever, 1046 days; and impetigo, 1017 days. Scarlet fever was well below the average of recent years.

From the School Reports

CHORLEY

Dr. Eric C. Downer, recently appointed M.O.H. for Tipton and formerly of Chorley, presented to the education committee of the latter borough a report of a second survey of the nutrition of the children attending elementary schools. Between his first survey made in the late winter of 1939–40 and his second in the autumn there was a noticeable deterioration, attributed in part to war conditions and in part to the aftermath of an epidemic of measles which occurred in the summer months. Arranged in the four categories of the Board of Education's classification, there was no change in the percentage of those assigned to groups A and D, but the percentage of B (normal nutrition) was 73·8 in the first survey and 63·3 in the second, and of C (subnormal nutrition) 19·4 in the first and 29·8 in the second. Dr. Downer recognises six groups of causes of malnutrition and gives the numbers of children in which each of these has operated. As in many cases of malnutrition more than one group of causes is involved the total number in these groups does not correspond with that of the children inspected. In the second survey 695 malnourished children were detected, of which 569 were fully examined. Of these 397 suffered from present or transient ill health. In 72 malnutrition was attributed solely to the sequelæ of measles and in twice that number measles was a contributory cause. Actual shortage of food was held accountable for 39 cases; improper feeding to be wholly or partly responsible for 110, and errors of hygiene and environment for 263. Of the children found malnourished in the first survey about half had recovered in the interval between the surveys.

NOTTINGHAMSHIRE

Dr. Christopher Tibbits gives the analysis of the nutritional state of the Nottinghamshire children routine-inspected in 1939 as A, 7·06%; B, 84·72%; C, 8·12%; D, 0·08%. These are lower for A, C and D but higher for B than the averages for the whole country. The dividing line between the groups is arbitrary and depends much on individual interpretation, which is most varied as regards A and least as regards D. Many doubt the validity of group A, holding that children assigned to this category are either those nourished to their full potential—in other words, the only children who are fully healthy in this respect—or children the subjects of abnormal endocrine balance, who in reality are diseased and badly nourished. There is little variation of opinion as to which children should be assigned to group D, which includes the comparatively few children who are starved and a much greater number suffering from serious disease. The important line of demarcation is that between B and C, which obviously should be the norm, but this at present is undefinable.

Nottinghamshire school medical service suffered severely in 1939 from depletion of its staff by resignations and sickness of school medical officers. This was not connected with the war as it occurred before war was expected. It was found impossible to secure suitable candidates under the terms of the B.M.A. scale to fill the vacant posts, so it was decided to renominate the posts as assistant county medical officers with the appropriate higher salaries (£600 rising to £700).

Obituary

GORDON ALAN MACDONA LINTOTT

M.D. LOND., M.R.C.P.; MAJOR R.A.M.C.

Gordon Lintott was the second son of Mr. Harold Lintott of Horsham. He was born in June, 1908, educated at Felsted School, and entered Guy's Hospital in 1925. He qualified in 1931, completed his London M.B. in 1932, and obtained the M.R.C.P. in April, 1934, and the M.D. in December, 1936. Even as a ward-clerk he stood out as being exceptionally keen and able. He was appointed house-physician to Dr. Ryle in 1932 and became demonstrator of physiology and pathology the same year. In July, 1933, he was medical registrar and in 1935 clinical tutor in charge of the preliminary clinical period class. He held this appointment until, after spending some months studying gastroscopy in Germany under Henning and visiting clinics in America, he was elected assistant physician to Guy's in July, 1939. From 1935 he was on the staff of the Asthma Research Clinic and from 1936 to 1938 was physician to the massage and electro-therapeutic department.

It was Lintott's ambition from the outbreak of war to serve in the Army, but it was not until March, 1940, that he was allowed to resign from the E.M.S. and join the R.A.M.C. He was appointed medical specialist to the 23rd General Hospital and was later transferred to the 27th General Hospital, with which he went overseas in August. He was glad to be again actively employed in the care of patients and in lecturing both on board and after his arrival in the Middle East. He was taken ill with severe dysentery on Nov. 7 and was admitted to the 19th General Hospital, where he remained under the care of an old friend and Guy's colleague until his death on Dec. 23.

Lintott was interested in every branch of medicine. He published original observations on regional ileitis, the factors involved in the varying incidence of cancer of the stomach in different social classes and in different countries, the epigastric murmur occasionally heard in cases of portal obstruction, and the treatment of rhinorrhœa. But his most important contributions to medical science were the results of his gastroscopic investigations. He was the first British physician to learn to use the modern flexible gastroscope. He soon became an expert, and he wrote several papers on the appearance of the gastric mucous membrane in various pathological conditions. He also studied the action of drugs on the gastric mucosa, and discovered that aspirin produces a local hæmorrhagic reaction, especially in predisposed individuals, in whom it may result in actual hæmatemesis.

He was much interested in water-divining or dowsing, and in 1933 he published in the *Guy's Gazette* an account of some ingenious observations on the subject which, encouraged by the late M. S. Pembrey, he carried out in an atmosphere of the profoundest scepticism under experimental conditions in the physiological department as well as in the open air in Sussex. At Guy's an apparatus was constructed by means of which water could be run in a pipe beneath a platform without the knowledge of the observer. He found that a small percentage of people, when provided with a twig of privet, reacted directly their feet came over running water. There was an immediate upward movement of the twig, the result of increased tension of the muscles of the forearm. Mistakes were very rarely made, and the position of a hidden pipe in the laboratory or a drain or spring in the field was always accurately located. The response was not obtained if the muscles of the legs were completely relaxed or the feet were placed on a smooth surface such as glass or polished metal, though the interposition of such substances or of air between the water and the dowser did not interfere with it. Lintott clearly proved

that water-divining is a genuine subconscious faculty, which depends on the reception by the muscles of the legs of a stimulus produced by running water and expresses itself in a change of tone in the muscles of the arms.

His chief hobby was riding. He was a true horse lover and a very fine horseman. In order not to miss his early morning ride he almost always spent the night at Horsham, even when hard at work all day at the hospital. He hunted regularly from childhood with the Crawley and Horsham hounds, where his cheery disposition and sportsmanship endeared him to all members of the hunt. He won several point-to-point races, the last being at Eridge a few months before the outbreak of war.

Lintott was a born teacher. His classes for preliminary clinical studies were extremely popular, and his ward-rounds and outpatient clinics were appreciated by both junior and senior students. He was an excellent clinician and gave promise of becoming a really great physician. He had a charm of manner which made him universally popular, and nobody could be in his presence for even a short time without feeling that Guy's had indeed been fortunate in the latest addition to its staff. It is tragic that a man of such outstanding character and attainments should die at the early age of 31 after only a few months' service as assistant physician to the hospital.

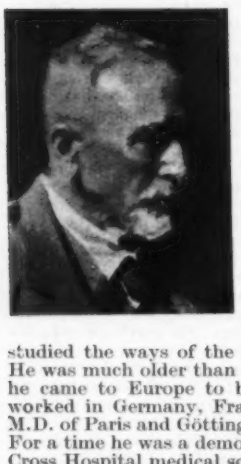
A. F. H.

A. H. D. writes: My grief at the loss of Alan Lintott will be shared by his colleagues at Guy's and all the students who owe so much to his inspired teaching. In spite of his invariable early-morning ride he yet arrived at Guy's from the country before most of us, and throughout the day showed his tireless energy in his teaching and clinical work. He had a charm of manner and a fine sense of humour rarely found in men of his attainments, and with it all so genial a spirit that he never failed to gain the true affection of those with whom he came in contact. His home life was equally attractive, for his love and devotion to his parents was a delight to witness.

ARCHIBALD WATSON

M.D. PARIS AND GÖTTINGEN, F.R.C.S., L.S.A.

SOME men bear strikingly the stamp of a period not their own. Professor Watson, who died on Thursday Island last year at the age of 91, would have been more at home among Elizabethans than among men of his own day. He had none of the staid and formal quality of the traditional professor; he was a lovely conversationalist, a man with a river of talk and a vivid lecturer who illustrated his points on the blackboard with clever, rapid drawings. When he lectured on surgical anatomy he used the experiences of himself and others as illustrations and praised or damned as he thought the work deserved. He had a sense of the dramatic and could make his points so that they were never forgotten. His eccentricities are among the legends of Australia. He had sailed the southern seas and studied the ways of the fish; he spoke many tongues. He was much older than the usual run of students when he came to Europe to begin his medical studies. He worked in Germany, France and London and took his M.D. of Paris and Göttingen and his F.R.C.S. of England. For a time he was a demonstrator of anatomy at Charing Cross Hospital medical school and afterwards went back to Australia. When Sir Thomas Elder endowed a medical school at Adelaide University, Watson was appointed professor of anatomy and held the chair from 1884 to 1919. During the South African War he was consulting surgeon to the Natal field force, and he served in Egypt during the war of 1914–18. He was a skilful, conservative surgeon, who detested unnecessary umbilation of tissues. The anatomical planes of the body fascinated him, and he studied bloodless approaches to the viscera. His reputation as a surgical anatomist was world-wide, but he wrote little. Outside his work he had extensive interests and the devouring industry which is said to be a part of genius. He never married. When he became emeritus professor on retirement his friends and pupils subscribed for the fine portrait by McInnes reproduced here.



WILLIAM ARTHUR SPONG

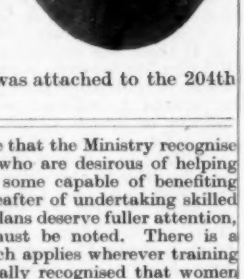
M.B. DUBL., L.M.; LIEUT.-COLONEL R.A.M.C.

Colonel Spong was born at Toxteth Park, Lancs, in 1883 and graduated from Trinity College, Dublin, in 1907. Shortly afterwards he joined the R.A.M.C. and when the last war broke out he held the rank of captain. For a time he was employed on embarkation and distribution duties in Karachi and during his long term of service in India he was brought to the notice of the Government of India for his services. At the beginning of 1926 he was appointed deputy assistant director general at the War Office and in 1931 he was promoted lieut.-colonel. Two years later he retired and set up in practice at Sutton Benger in Wiltshire. As a busy country doctor perhaps he worked as hard as ever, but he and his patients liked each other. He was also a keen shot and angler and opportunities for his favourite sports were at hand. When war broke out again he joined up at once and was appointed officer commanding the military hospital where he died after a short illness on Dec. 22.

DUNCAN MACKENZIE

M.B. EDIN., D.P.H.; LIEUTENANT, R.A.M.C.

Lieutenant Duncan Mackenzie was accidentally killed by a fall from a train near Larbert on Nov. 6 while going on leave to his home in Sutherland. He was the son of Captain and Mrs. Mackenzie of Stoer, Lairg, Sutherland, and was 29. He was educated at Golspie and at Edinburgh University where he graduated in medicine in 1935, taking his D.P.H. four years later. After a period in practice in Stockton-on-Tees he held house-appointments in the Victoria Hospital, Worksop, and the Royal Victoria Hospital, Edinburgh, and in 1939 became assistant in the Edinburgh Fever Hospital. He joined the R.A.M.C. in March, 1940, and was attached to the 204th Field Ambulance.



". . . It is satisfactory to note that the Ministry recognise that amongst the many women who are desirous of helping in industry there will be found some capable of benefiting from intensive training and thereafter of undertaking skilled work. The Ministry of Labour's plans deserve fuller attention, but the more striking points must be noted. There is a standard scale of allowances which applies wherever training is given. It has also been officially recognised that women as well as men have dependants and the allowances for dependants are the same in both cases. Where convenient men and women will be trained side by side on identical processes. There is no upper age limit, but trainees must be able to stand the strain of war-time conditions. Later selected women will receive training in the more skilled work, for the edict has gone forth that every man and woman must be used to the utmost degree of their skill. Fuller details can be obtained from Employment Exchanges and Technical Colleges."—Miss CAROLINE HASLETT, C.B.E., in a paper on "Women in Industry" read before the Society of Arts on Jan. 15.

Notes, Comments and Abstracts

POSTWAR HOSPITAL POLICY

THE Nuffield Provincial Hospitals Trust was founded in December, 1939, and at the end of its first year the chairman has reported to the Minister of Health that the central regionalisation council of the trust has been formed, that a medical advisory council has been established under the chairmanship of Sir Farquhar Buzzard and that an advisory committee has been set up for Scotland under Mr. Tom Johnston as chairman, with a medical advisory committee under Sir John Fraser. Discussions on arrangements for regionalisation of hospital services have taken place in many provincial centres with representatives of the public-health authorities and of voluntary hospitals. In some of these centres plans for the formation of regional councils are already completed or are well advanced, and it is hoped to set them in motion in many others at an early date. The trustees expect to be able to consider the question of financial grants to regional councils from the income of the trust shortly.

In acknowledging the report Mr. Malcolm MacDonald writes: "The question of postwar hospital policy is one of major importance, and I am sure that the trust is right in attempting, even during the heat and labour of the present struggle, to focus discussion by bringing together in its regional councils representatives of the various interests concerned. . . . I think you are right in concentrating on two points. Whatever may be the proper ultimate hospital service, we should build up from existing organisations, and the first is, therefore, to find the right relation between the local authorities on the one hand and the voluntary hospitals on the other. Both have played a great part in our hospital system in the past and will, I am convinced, make essential contributions to the future. . . . Secondly, I am convinced that the problem is one that must be examined on a basis wider than that of existing local-government areas and that some form of regional unit will be necessary in designing a system which will make the best use of our existing hospital accommodation and will avoid duplication and waste in making good any deficiencies."

SUNDAY SLEUTHING

IN "All Is Vanity" (Longmans, 7*s.* 6*d.*) Miss Josephine Bell returns to detection, and everyone will be pleased that Dr. Wintringham has another case of murder to diagnose. This time he gets a lot of help from Ted, a shrewd young cockney, and his tandem partner, Elsie, who one Sunday morning are separated by a puncture from the rest of their cycling club on the way to Eastbourne. In the shortest of time they have not only mended the puncture but also unearthed a corpse and some promising clues. The corpse they share with the police but they are more reticent about the clues. They made their find as trespassers in the grounds of the snobbish household where the Wintringhams are reluctantly lunching, and by virtue of their status as body-finders Ted and Elsie join the party. Though Miss Bell never loses sight of her murderer she takes the opportunity to lace the chase with a little acceptable social satire, and by the end of the book we feel with Ted and Elsie that we have spent an unusual and stimulating Sunday.

A RUSSIAN SURGEON

George Sava, of mixed Russian and Bulgarian stock, was born and bred in Tsarist Russia. At the age of 8 he left home and took the golden road to Samarkand, there to become heir to a wealthy but childless uncle to whom he grew greatly attached. Later, he was sent to Kronstadt to be trained as an officer in the Imperial Navy. But the war and the Red Revolution changed all that and by the age of 36 he had become a London surgeon. His practice, now interrupted by military service, seems to have covered a wide field, for it included plastic and cerebral (as well as abdominal) operations, midwifery, and the diagnosis of "tired heart" in ballerinas. In "Twice the Clock Round" (London: Faber and Faber. Pp. 280. 8*s.* 6*d.*) he has used the hours of the day and night as chapter titles—convenient pegs on which to hang his thoughts and reminiscences, professional and otherwise. The result is an entertaining, if not particularly profound, book written in a pleasantly prattling and ingenuous style.

BLOOD-TRANSFUSION EQUIPMENT.—The mobile blood-transfusion unit [1] presented by the Australian Red Cross Society to the 2nd A.I.F. is equipped with Soluvac collecting flasks, manufactured by Elliotts and Australian Pty. Ltd., of 20–22, O'Connell Street, Sydney, N.S.W. This firm also supplies sealed sterile flasks containing fluids for intravenous infusion, and a different type of apparatus for civil blood-transfusion, specially suited to the needs of the general practitioner.

CARBACT.—Messrs. Wilcox, Jozeau and Co. have issued a highly adsorptive tablet with antiseptic and mildly laxative properties for use in cases of bacterial or chemical intoxication, dyspepsia, gastro-enteritis and kindred ailments. These carbact tablets each contain activated charcoal gr. 3, bismuth tribromphenate gr. 1½, dry extract of rhubarb gr. ¼, and excipient to gr. 7½.

VARISTAB is a stable aqueous 5% solution of ethanolamine oleate with 25% glycerin and 0·3% tricresol for the injection treatment of varicose veins. It is prepared by Boots Pure Drug Company (Nottingham) and is supplied in 5 c.cm. ampoules and 30 c.cm. rubber-capped vials.

A NEW VACUUM GAUGE.—Those whose lot it is to measure high vacuums in the course of the daily round will be interested in a new inexpensive vacuum gauge which covers a serviceable range of low pressures (10–0·01 mm. Hg) and is at the same time easy to operate. Messrs. W. Edwards & Co. of London have recently perfected their new Vacustat which they claim shows improvement in mechanical design on the foreign models. It is a modification of the McLeod gauge, but though similar in principle differs from it in construction and method of use. It measures only 9 in. in height and is readily portable.

H. R. NAPP (London) inform us that they are now manufacturing Sanocrysin in England, and as the stocks of the formerly imported article are exhausted they will distribute the British-made product under the name of Novacrysin (intravenous) and Oleo-Novacrysin (intramuscular).

Births, Marriages and Deaths

BIRTHS

CLARK.—On Jan. 10, at Northowram, the wife of Major T. Lindsay Clark, R.A.M.C.—a son.

EVANS.—On Jan. 8, at Chelford, Cheshire, the wife of Dr. E. S. Evans—a son.

KIDD.—On Jan. 11, at Rugby, the wife of Dr. Patrick Kidd—a daughter.

MARRIAGES

ADLER—MORTIMER WOOLF.—On Jan. 8 Paul Sabel Adler, M.R.C.S., Lieutenant R.A.M.C., to Margaret Phœbe Woolf.

FINN—WORKMAN.—On Jan. 11, at Helensburgh, Andrew Bartley Rigden Finn, M.B., Surgeon Lieutenant, R.N.V.R., to Marion Elise Workman.

HARVEY—FINZEL.—On Jan. 4, at Bristol, Geoffrey Hammond Harvey, M.B., to Madeleine Isobel Finzel.

LIVINGSTONE-LEARMONTH—MORTON.—On Jan. 10, at Dalmeny Church, Basil Lockhart Livingstone-Learmonth, M.B., to Mary Stevenson Morton.

DEATHS

BREWER.—On Jan. 2, at Kingskerswell, Devon, Alexander Hampton Brewer, M.R.C.S.

GOULD-HURST.—In January, through enemy action, Stuart Victor Gould-Hurst, M.A. Camb., M.R.C.S., his wife and their son John.

IRVING.—On Jan. 9, at Inagh Mount, Scarborough, John Irving, M.D., in his 86th year.

KILLICK.—On Jan. 6, at Williton, Somerset, Charles Rowe Killick, M.B. Lond., F.R.M.S.

MCKAIL.—On Jan. 10, at Glasgow, Robert Buchanan Forbes McKail, M.B., D.P.M., late medical superintendent of Brockhall Certified Institution for Mental Defectives, Langho, Lancashire.

ROBERTSON.—On Jan. 7, in London, Thomas Robert Robertson, M.B. Edin., late Colonial Medical Service.

ROY.—By enemy action, Alexander Roy, M.B. Aberd., aged 43.

SWAN.—On Jan. 6, Andrew Tynan Swan, M.B. R.U.I., of Corringham Road, N.W., aged 62.

TILLEY.—On Jan. 6, at Weybridge, Herbert Tilley, M.D. Lond., F.R.C.S., aged 74.

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1. See *Lancet*, 1940, **2**, 154.

Medical News

Royal College of Surgeons of England

At a meeting of the council held on Jan. 9 with Sir Hugh Lett, the president, in the chair, Surgeon Rear-Admiral G. Gordon-Taylor was appointed Bradshaw lecturer, and Mr. L. R. Braithwaite Moynihan lecturer for 1941. Dr. Gilbert Orme was reappointed as the representative of the college on the council of the Queen's Institute of District Nursing. The Hallett prize adjudged on the result of the recent primary fellowship examination was awarded to J. D. T. Jones of Durham University.

The posts of the three house-surgeons at the Palmerston North Hospital, New Zealand, were recognised for the six months' surgical practice required of candidates for the final examination for the fellowship.

Diplomas in psychological medicine were granted jointly with the Royal College of Physicians to Margaret M. Methven, G. C. Rae and B. A. M. Williamson.

Dr. R. E. Smith will deliver his Hunterian lecture on the undescended testicle at 3 P.M. at 1, Wimpole Street, W.1, on Thursday, Jan. 23 and not on Jan. 24.

Further Extension of the Medical Register

An emergency order dated Sept. 14 (see *Lancet*, 1940, **2**, 398) enabled the General Medical Council to register Canadian and U.S.A. doctors for the duration of the war. A second order now extends this permission to doctors qualified to practise in any part of the British Empire, in the countries of our European allies, or in Germany or Italy. Under the second order the doctor must be selected either for a medical commission in one of the fighting forces or for employment in a hospital, institution, or service, not involving attendance in the patient's own home. The Central Medical War Committees for England and Wales and for Scotland are compiling a list of doctors qualified for registration under the orders. Any of these doctors may make provisional application for registration to the G.M.C. to avoid delay when he is selected for employment.

At the annual meeting of the Ling Physical Education Association on Jan. 8 Mr. R. E. Roper demonstrated his posture-recording apparatus which he said not only showed the patient exactly where the defects in his posture lie but could also be used in training students in observation. Miss P. C. Colson, one of the members of the Government directorate of physical recreation, afterwards appealed for support for their work. She denied that they wished to form any organisation parallel to the Hitler youth or that they wished to sweep away existing voluntary organisations. The true aims of the directorate were to help to stimulate enthusiasm among young people and to make wider provision for the 14–20 age-group. They did not want a feverish drive for fitness for fitness sake but rather the attainment of balance. The directorate held that physical recreation was part of a comprehensive scheme of health education. Miss Colson emphasised that if the Fisher Act could be brought into force the provision of day-continuation schools would do much to ensure the welfare of these young people.

Sir Ernest Graham-Little has been unanimously re-elected chairman of the council for external students of the University of London for the year 1940–41.

The deaths of Lieutenant L. H. Macdonald, M.B. Birm., R.A.M.C.; T/Major W. T. M. Moar, M.R.C.S., R.A.M.C.; Lieutenant Dan Bradbury, M.B. Sheff., R.A.M.C., have been announced in recent casualty lists.

On Tuesday, March 11 at 2.30 P.M., Mr. C. F. A. Pantin, F.R.S., reader in invertebrate zoology in the University of Cambridge, will give a paper on the origin of life to the Royal Institution, 21, Albemarle Street, London, W.1.

The Association of Architects, Surveyors and Technical Assistants and the National A.R.P. Coördinating Committee are holding a conference on air-raid precautions. Councillors and administrative officers in the London area are invited to the Islington Central Library, 68, Holloway Road, N.7, on Feb. 2 at 10 A.M. The subjects for discussion will include air-raid shelters; medical aspects; care of those bombed out; and administration.

The American Social Hygiene Association has awarded the Snow medal for 1941 to Mrs. Neville-Rolfe, secretary-general of the British Social Hygiene Council.

Appointments

DAVEY, J. B., M.B. Lond., D.T.M.: senior M.O., Tanganyika Territory.

EDEN, KENNETH, M.S. Lond., F.R.C.S.: surgical registrar at University College Hospital, London.

FERGUSON, T. T., L.R.C.P.E.: deputy medical superintendent at Lennox Castle Institution.

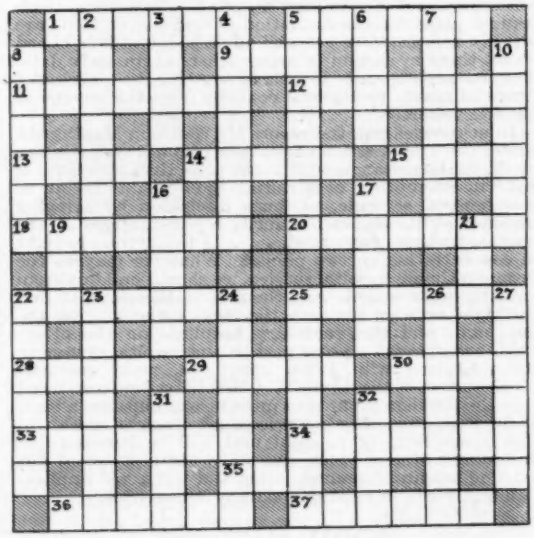
HUTCHISON, ALEXANDER, M.D. Glasg., F.R.F.P.S., D.P.H.: port M.O. for Glasgow and Clyde.

MASINA, A. H., M.B. Camb., M.R.C.P.: R.M.O. and asst. pathologist at Bradford Royal Infirmary.

MCGLASHAN, FRANCES E., M.B. Aberd.: temp. asst. M.O. at Brockhall Certified Institution, Langho, Nr. Blackburn.

PAISLEY, J. C., M.B. Belf., D.T.M. & H., D.P.H.: temp. asst. M.O. for Dorset.

LANCET CROSSWORD



ACROSS

1. Responds by kicking over the traces (6).
5. Add even one ion and you get a shelter problem (6).
9. Found in every corpuscle, and polymorphs make much of it (3)
11. Phagedena is spreading round half Europe (7).
12. This piece of ward equipment is a 'bus (7).
13. Surgical detector (Two words, 1, 3).
14. If you have this it may this your dentist (5).
15. Inflamed ? So it is (4).
18. Apices to a T (7).
20. Bring a little science to his manuscript if you want the breaks (7).
22. Whatever does this is seldom caught bending (7).
25. Is this another German invasion ? (7).
28. Mine makes it very soothing (4).
29. A good egg—but only a little one (5).
30. Follow it by all means, but you may get fooled near the top (4).
33. Almost nine after the soap (7).
34. The man who dictates to the editor (7).
35. You probably find it tedious to write this, even when you leave the vowels out (3).
36. Suppurates—but only if it gets a head (6).
37. 10 c.c.—and out goes she (6).

DOWN

2. Certainly not an early bird to imitate (7).
3. There is a young horse in this lump of matter (4).
4. Saint in aspic ? (7).
5. The link between lobes (7).
6. Presentations not always pleasing (4).
7. A bit of a lawsuit in the birthplace of Hippocrates (7).
8. This bothers the anæsthetist in cases of chest injury (6).
10. Add it to this and the muscle becomes inflamed (6).
16. A floppy state of things (5).
17. Little light can be thrown on this phobia—it is too painful (5).
19. Havelock Ellis wrote volumes on this (3).
21. This union pleases nobody (3).
22. Follows custom and—cut it out ! (6).
23. It leaps—if its anagram will let it (7).
24. "La République n'a pas besoin de—— " (7).
25. An unhappy return (7).
26. She has a complex, nowadays (7).
27. Accused of erythrodontia and erythro-onychia (6).
31. U for a unit of weight (4).
32. Righteous spirit ? Only if rectified (4).

Sir Henry Head has left the greater part of his estate of £144,000 to the Royal Society for the advancement in England of the science of medicine.